PUBLIC WORKS

Aug. 1955

CITY, COUNTY AND STATE

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B. A. Crocker, City Engineer of Longview, Texas, is a recent past president of the Texas Water & Sewage Works Ass'n. The rapid growth of his city has required the solution of many engineering problems. See page 26.

how much does it cost... to have *Safest* CHLORINATION?

Nothing—when you buy a Fischer & Porter Chlorinator. That's true because fool-proof safety features are already engineered into this modern, instrument-type chlorinator.

> The F&P Chlorinator is instrument engineered from top to bottom to be absolutely safe in any emergency—and the safety features respond instantly. The mechanical design—without hydraulic devices to introduce time lag—make this a certainty . . .

In the F&P Chlorinator you can take a hammer and shatter the flowmeter tube—and the chlorinator shuts down *instantly*.

In the F&P Chlorinator you can pull the flow setting needle valve right out of its socket—and the chlorinator shuts down *instantly*.

In the F&P Chlorinator you can shut off the ejector water supply while leaving the chlorine on—and the chlorinator shuts down *instantly*.

In the F&P Chlorinator a simple series of hand manipulations tests each safety component—or shows the reason for malfunctioning should it ever occur.

These safety advantages are yours in the Fischer & Porter Chlorinator. They cost you not one penny more at the outset, since the F&P Chlorinator is lower in first cost. They avoid constant costs of repeated safety tests and checks. They assure you against high costs of repairs and maintenance. We don't put our safety devices under a bell jar—they are right out in the open where you can see and touch them.

These engineered features—*instrument-type engineering*—make the F&P Chlorinator the safest ever built. And you get all these safety features *plus* ease of operation, dependability proven in over 600 operating units, complete corrosion resistance—everything you should have in a chlorinator—and you get them for even less cost in the initial purchase. Write today for full information, details on free trial offer, and *absolute guarantee of satisfaction.*

complete process instrumentation

FISCHER & PORTER CO.

545 Fischer Road, Hatboro, Pa.

FP

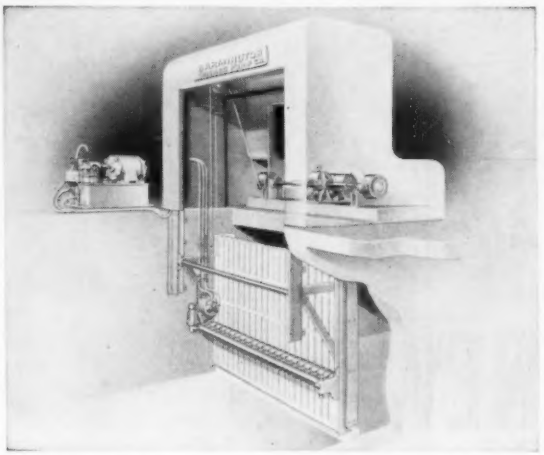
18 YEARS SUCCESSFULLY MANUFACTURING CHLORINE CONTROL EQUIPMENT

Greater Flexibility in Comminution*

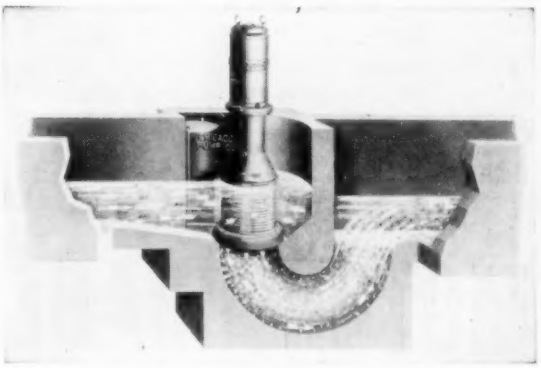
For Sewage Flows From .005 to 250 MGD Per Machine Installed In A 6" Pipe, A Basin Or A Rectangular Channel Section.

The greater flexibility and wide applicability of comminution made possible by the equipment illustrated here is the result of Chicago Pump Company's original development of comminution and the Comminutor and its 20 years of experience in over 4000 installations of exclusively successful comminution.

**Continuous screening and subsurface cutting of coarse sewage material without removal from the sewage flow, eliminating unsightly mess, nuisance and odor from screenings.*

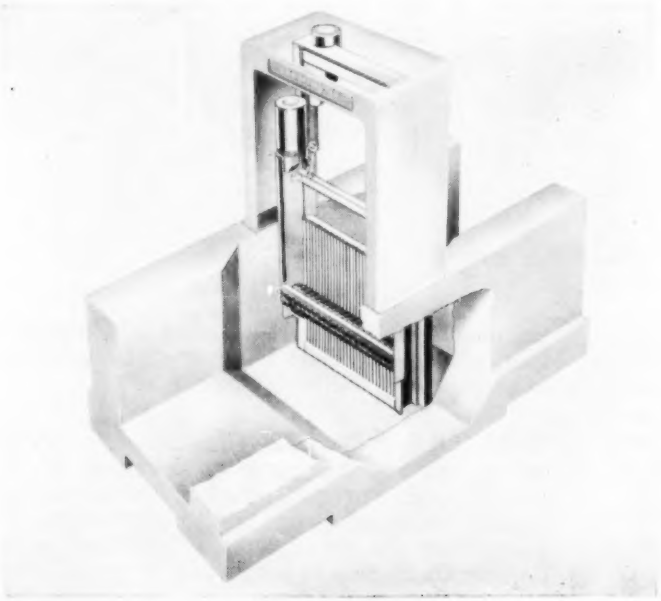


Model "A" Barminutor Screening and Comminuting Machine. Designed for use in rectangular channel sections 4 to 12 feet wide, sized for flows of 10 MGD and upwards.



The Comminutor Screening and Comminuting Machine. Designed for use in hydraulically designed feeder basin, sized for flows from .175 to 25 MGD per machine.

◀ Model "B" Barminutor Screening and Comminuting Machine. Designed for use in rectangular channel sections 1 to 3 feet wide, sized for flows from .09 to 15 MGD.



Model 7B Comminutor Screening and Comminuting Machine. Designed for use in 6" or 8" sewer pipe, sized for flows from .005 to .175 MGD per machine.

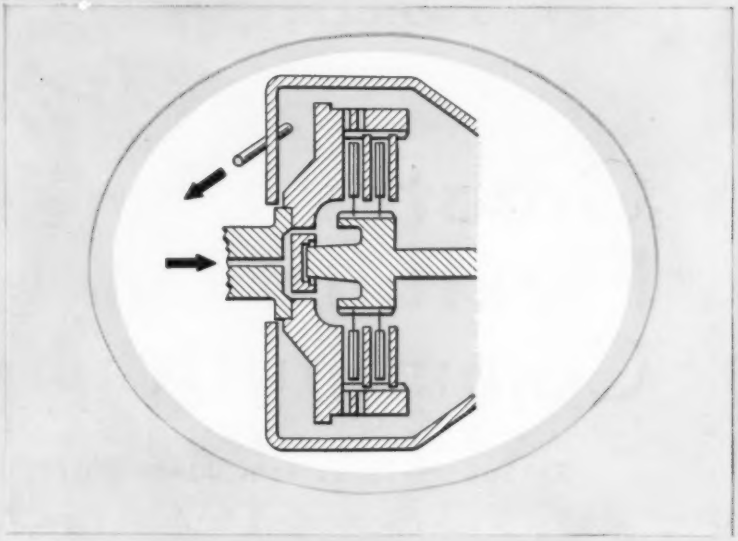
CHICAGO PUMP COMPANY
Subsidiary of Food Machinery and Chemical Corporation
SEWAGE EQUIPMENT DIVISION
622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Flush Kleen ®, Scru-Peller ®, Plunger, Horizontal and Vertical Non-Clogs Water Seal Pumping Units, Samplers . . . Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Barminutor ®, Comminutors.

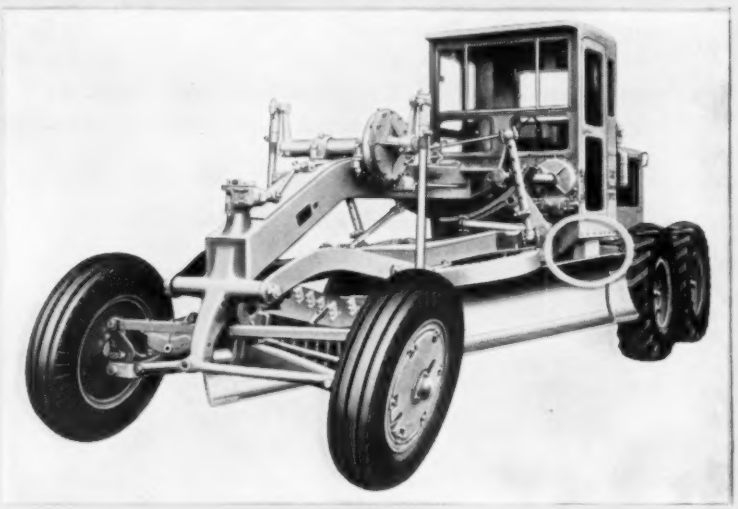
Now's the time to mail this month's Readers' Service card.

CATERPILLAR ANNOUNCES ANOTHER "FIRST":

NEW OIL CLUTCH for the NO. 12 MOTOR GRADER



Arrows show path of oil through housing with clutch disengaged. Facings remain cool and bathed in oil, which is carried to outlet at top by flywheel ring gear. The two steel clutch discs and clutch brake are faced with pressure-processed cork, which gives an excellent coefficiency of friction and long wear.



The new oil clutch for the No. 12 Motor Grader gives you the same reliability and improved performance as the thoroughly job-proved oil clutch in Caterpillar track-type Tractors. Rugged and reliable, it uses oil from the engine lubrication system. Here are some of the things the new oil clutch for the CAT* No. 12 can mean to *you:*

LONGER WORK LIFE—In actual on-the-job tests, clutch facings wear less than the thickness of a human hair in one thousand hours' operation! Thick clutch facings mean that work life is extended thousands of hours before discs need be replaced. And constant "oil bath" lubrication reduces wear on all moving parts.

LESS MAINTENANCE—Adjustment every 1500 hours is not unusual, after initial "break in." This is equivalent to nearly nine months without adjustment on road maintenance work! No external lubrication is needed: internal oil system lubricates pilot and throwout bearings.

GREATER EFFICIENCY—The clutch is constantly cooled, never exceeding normal engine oil temperature. This practically eliminates clutch fade, greatly reduces slippage due to overheating, and means that the clutch retains "like new" operation for thousands of hours.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Cat and Caterpillar are Registered Trademarks of Caterpillar Tractor Co., U. S. A.

99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE

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PUBLIC WORKS MAGAZINE

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THE MOST USEFUL ENGINEERING MAGAZINE FOR CITIES, COUNTIES AND STATES

Playing sandlot baseball is a thrill for any boy. But it's real big-league stuff to play ball under the lights. The same Westinghouse floodlights that illuminate most major-league ball parks. For youngsters in playgrounds, floodlighting means a full schedule of their favorite sport. For parents, it means their child can participate in organized sports after dark . . . away from busy streets and corner hangouts.

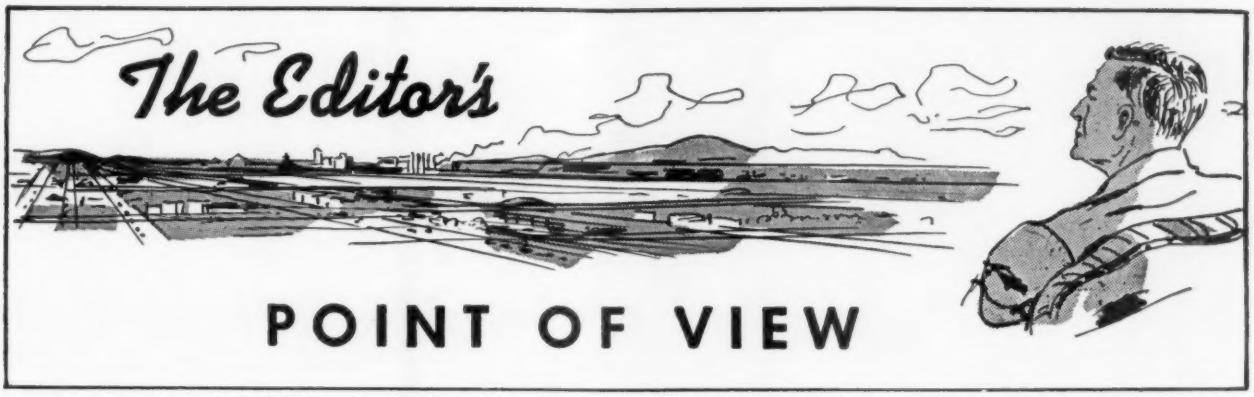
How about your city playgrounds? Are you utilizing your present facilities for after-dark recreation?

Ask your nearby Westinghouse distributor for a copy of *Planned Sportslighting,* bulletin number B-5872, or write Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio.

J-04386

YOU CAN BE SURE... IF IT'S Westinghouse

Now's the time to mail this month's Readers' Service card.



Weather Prediction: Colder, with Snow

CALENDARS tell us that winter will be coming soon, whether we like it or not. Because modern traffic and modern living, as well, demand open and safe roads, it is time right now to prepare to handle again this tremendous job. Available equipment must be looked over; new equipment, devices and materials ought to be investigated; rock salt must be ordered and stored; and the men who do the work must be organized and trained, for there will be key men missing from last year's group. Snow removal and ice control represent a very big operation and preparation has to start well in advance of need.

It is gratifying to be able to pass on to the snow fighters a small compliment. In no other branch of public service has there been a wiser recognition of the need for prompt and efficient service; and in no other field of operations has there been a quicker and sounder use of modern equipment. We congratulate alike the engineers and the manufacturers; together they have made this remarkable development in public service possible.

Two Men from Texas

TWO men from Texas have recently been in the news. Both have contributed greatly to the astonishing development of our great Southwest, for their influence has extended far beyond the bounds of the Lone Star State. Both are engineers who could well serve as models for the coming generation of young engineers.

One, of course, is V. M. Ehlers, now receiving honors for his nearly forty years of service as Texas' State Sanitary Engineer, but still as young in spirit and as full of plans and imagination as ever. Perhaps the greatest personal compliment your editor can pay him is this: I had some fifty of his young engineers under my direction as officers in World War II, and if there was a tough job to be done I always felt better if "Vic's" boys were on the job. They had a way of getting the job done, one way or another, something they learned from the "Chief."

Karl Hoefle has retired after many years of service to Dallas. He has richly earned a rest, for it was he that took on the difficult, and often thankless, job of providing water, water service and waste disposal for this fast-growing metropolis. Over the years he has done a masterful job, but he has done it so smoothly and so efficiently that not many have realized the outstanding value and soundness of his work. A remarkable engineer and an equally fine gentleman, the good work he has done will long remain a blessing to the people of Dallas.

That Big Road-Building Program Will Pay Out in Other Ways

NO ONE seriously doubts that the proposed multi-billion dollar road program will pay for itself many times over in savings in time, in accident reduction and in business acceleration. We believe that another very substantial and long-time saving will accrue from the development of more efficient machinery, materials and methods for highway construction and maintenance.

If we look back three decades to the revolution in earth-moving coincident with the beginnings of the big state highway construction programs, we can get a preview of what is going to happen. The cost reductions accomplished by that revolution have saved us billions of dollars and are still saving us money whenever we do any construction work.

What forms these new developments will take, we do not know; but there is no doubt that they will represent a long step toward more complete mechanization of road building and road maintenance. The result will be better and cheaper highways for the future.

Fellowship in Civil Engineering Honors Bernard Gray

IT WAS an unusual pleasure to have word that the Asphalt Institute has created the Bernard E. Gray Fellowship in asphalt technology at the University of Maryland. This is a course of study for young civil engineers. It is well named for no man contributed more than Bernard Gray to the development of modern flexible pavements. It is hoped that more such scholarships may be established and at other engineering schools.

Serves so well....

Installing 16" cast iron pipe for water line in Chicago, Ill.

Installing 12" Standardized Mechanical Joint pipe for Fall River Gas Works Co., Fall River, Mass.

Cast iron pipe installed for East Providence, R. I., Sewage Treatment Plant.

CAST IRON PIPE

Now's the time to mail this month's Readers' Service card.

so many ways

A list of the many applications in which cast iron pipe serves so well might surprise you. Check them off. In *water* service—fire protection and supply lines, feeder and distribution mains, purification plants. In *gas* service, mechanical joint cast iron pipe is widely used for distribution mains. In *industrial* service, applications are almost endless in petroleum, process, chemical, paper and other industries.

Where effective resistance to corrosion and sustained carrying capacity are indispensable to long life and economy, specify cast iron pipe with confidence. For information write Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.

CAST Q IRON ®

The Q-Check stencilled on pipe is the Registered Service Mark of the Cast Iron Pipe Research Association.

Standardized Mechanical Joint pipe water line installed in Mobile, Ala.

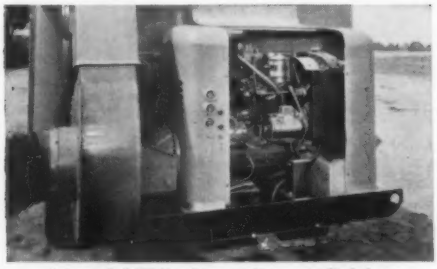
36" flanged Ell with special base for Chicago filtration plant.

SERVES FOR CENTURIES...

Get full details of this month's products . . . mail your Readers' Service card today.

Leaf Collector operates quickly and efficiently—even in hard-to-reach places.

COMPLETELY NEW...IN DESIGN AND PERFORMANCE THE GOOD ROADS LEAF COLLECTOR!



A powerful Willys Jeep engine controlled from an easy-to-reach control panel provides long years of trouble-free service.

Large 14 cu. yd. hopper with built-in hydraulic dump mechanism eliminates frequent trips to dumping site—smooth interior without obstructions, bolt-heads, etc.—equipped with removable exhaust filters.

Makes Short Work of Leaf and Litter Clean-up!

The all new Good Roads Leaf Collector with its increased power now makes it easier than ever to eliminate messy accumulations of leaves, paper and other debris from curbing, sidewalks, roadways, parks and other public grounds.

Its increased vacuum pulls wet or dry leaves and debris through a pulverizer, reducing it to an excellent ready-made compost. This action compresses debris into a compact material making frequent unloading trips unnecessary—provides more "collecting hours".

No Sweeping, No Dirt, No Mess

The Leaf Collector operated by a 2-man crew, a driver and intake tube operator, can cover many city blocks without emptying the hopper. Its efficient operation permits wide coverage and rapid street clean-up—frees help for other important work.

The larger reinforced rubber intake tube maneuvers easily and swiftly over a 7 foot wide area under and around parked cars and in hard-to-reach places—keeps sewers and drainage troughs clean—prevents costly stoppages and blocking.

The all-new self-dumping hopper is of all steel welded construction—Its low silhouette, smooth, projection-free interior provides easy maintenance and upkeep.

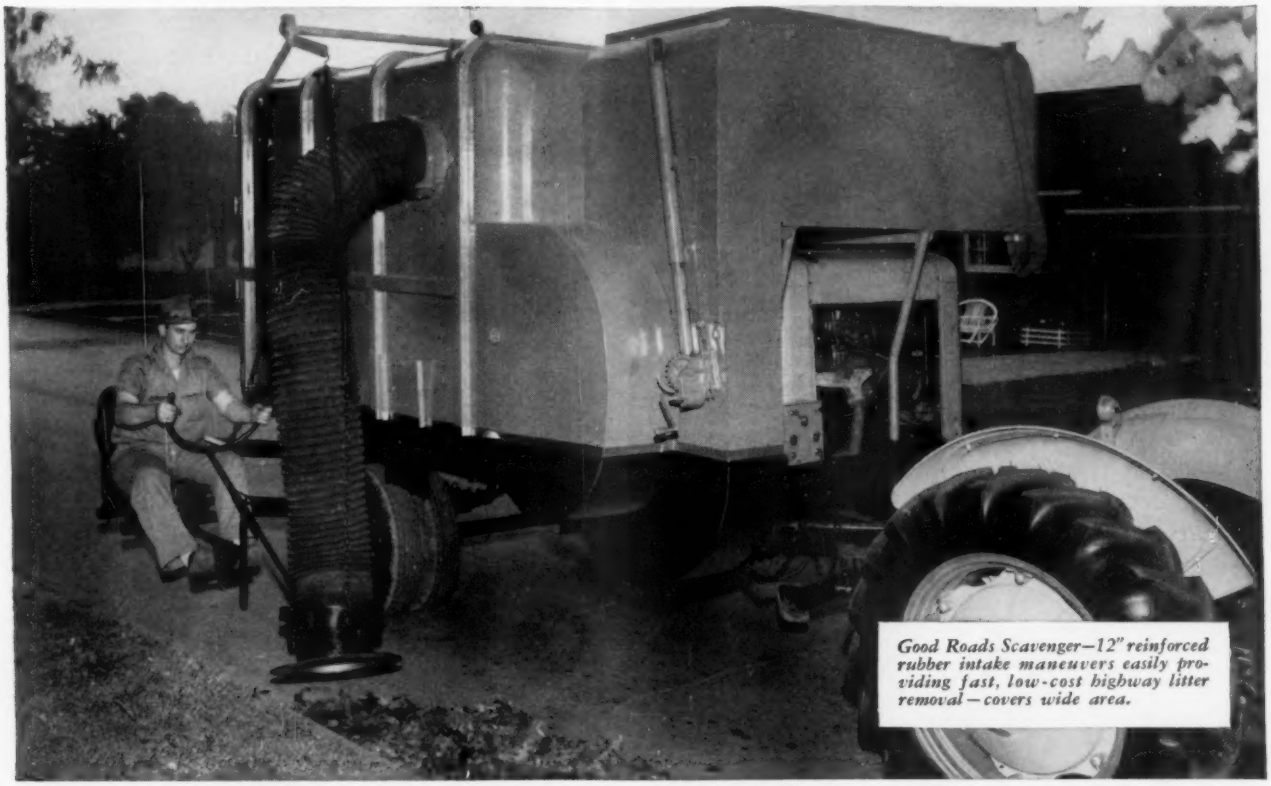
For complete details on how the Good Roads Leaf Collector, truck or trailer mounted, can help solve your street maintenance problems, write to:

THE GOOD ROADS MACHINERY CORPORATION
MINERVA, OHIO

ESTABLISHED 1878
Good Roads MACHINERY CORPORATION

SNOW PLOWS | ICE CONTROL SPREADERS | AGGREGATE AND ASPHALT SPREADERS | LEAF COLLECTOR | SCAVENGER

Need more facts about advertised products? Mail your Readers' Service card now.



Good Roads Scavenger—12" reinforced rubber intake maneuvers easily providing fast, low-cost highway litter removal—covers wide area.

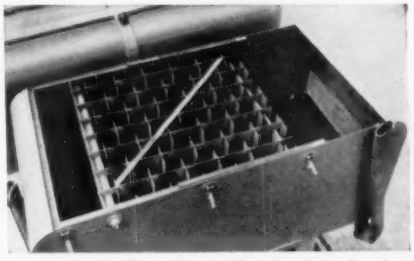
ANOTHER FIRST! THE GOOD ROADS SCAVENGER PROVIDES DUST-FREE OPERATION!

Used by state, county, city and township maintenance departments, the Good Roads Motorized Scavenger quickly and economically removes litter, rubbish and debris from highways, streets, alleys, parks, recreation areas, golf courses, cemeteries, etc.

The most outstanding feature of the all new Good Roads Motorized Scavenger is its dust-free operation. The exclusive Good Roads Dust Trap attachment filters and washes exhaust air so thoroughly that nuisance complaints, common with other debris collecting equipment, are eliminated . . . Even when picking up the driest materials and dust—the Good Roads Scavenger does not create dust! (The Dust Trap is optional equipment, and is also available for all Good Roads Scavengers now in use).

The Scavenger operating like a giant vacuum cleaner, sucks up bottles, cans, papers, rags, cartons, leaves, twigs and other debris—wet or dry. The refuse is whisked into the large 12 cu. yd. hydraulic, self-dumping hopper for quick disposal at dumping sites.

The Scavenger is available mounted on a heavy-duty, dual wheeled trailer or on a truck chassis—with manual or full power hydraulic intake tube operation—for complete details on how the Good Roads Motorized Scavenger equipped with the exclusive new Dust Trap can cut your litter removal costs, write to:



The exclusive Dust Trap—filters and washes dust from exhaust air—permits dust-free operation. Trap is by-passed when picking up wet material.

Far-reaching hydraulically operated intake tube (optional) provides greater maneuverability in hard-to-reach places above or below ground level.

THE GOOD ROADS MACHINERY CORPORATION
MINERVA, OHIO

ESTABLISHED 1878
Good Roads MACHINERY CORPORATION

SNOW PLOWS | ICE CONTROL SPREADERS | AGGREGATE AND ASPHALT SPREADERS | LEAF COLLECTOR | SCAVENGER

Thousands use our Readers' Service card to keep up to date . . . do you?

QUICK CLEANUP. Each day 45 tons of city garbage and much additional commercial waste is dumped at this river bottom site. But the TD-9 with Bullclam Shovel quickly gathers the refuse, places it in a trench which it had previously excavated, where it is compacted and covered at the close of each day.

Cedar Falls Finds Way to Banish Smog

Acrid Smudge disappears when Iowa city starts INTERNATIONAL DROTT Bullclam Shovel Method of Sanitary Fill

Each night along about bedtime the residents of Cedar Falls, Iowa, used to get wind of a sleep-stifling stench. It came floating up from the burning garbage dump in the river bottom, and sometimes the man-made smog didn't clear until noon.

But that's all just an unpleasant memory now, for Cedar Falls joined hundreds of other American municipalities—switching to the Bullclam Shovel Method of Sanitary Fill. And all it required was a modest investment in a TD-9 crawler tractor equipped with a matched Bullclam—a "One Man Sanitation Squad."

With this equipment, Cedar Falls city officials were able to snuff out the fire at the garbage dump, clean up the entire area, and handle the 45 tons of refuse daily in a safe and sanitary manner.

Operator George Baumgartner sums up the transformation this way:

"People living in the vicinity can sleep nights now. Taxpayers' complaints were changed to compliments, for we now have a dump that is free of flies, rats and odors."

If your city's refuse disposal costs are too high, call in your INTERNATIONAL Industrial Power Distributor. He'll show you how little it will cost to install the INTERNATIONAL DROTT Bullclam Shovel Method of Sanitary Fill . . . how much your community can benefit in health protection. He'll even provide expert assistance at no cost when you select the most advantageous disposal site. Call him soon.

DROTT MANUFACTURING CORP., MILWAUKEE 8, WISCONSIN
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

INTERNATIONAL®
DROTT

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

SMALL INVESTMENT, BIG RETURNS. The 41 drawbar horsepower TD-9 diesel crawler with Bullclam Shovel is paying big returns for Cedar Falls. At first the unit had to clean up the old messy garbage dump in addition to burying refuse. Now the disposal job is handled in a few hours each day and there is no mess—as is apparent in this photograph.

NEW FROM INTERNATIONAL DROTT!

Amazing 4-in-1 Skid-Shovel Converts Into a

- **BULLDOZER**
- **BULLCLAM**
- **SKID-SHOVEL**
- **CLAMSHELL**

By Shifting Hydraulic Selector Lever

City officials everywhere are talking about the amazing new 4-in-1 Skid-Shovel, the latest addition to the long line of INTERNATIONAL DROTT products.

Available on INTERNATIONAL TD-6 and TD-9 crawlers, the new 4-in-1 is the most productive and versatile tool ever. Use it as a Bullclam for a Sanitary Fill project—and then for the hundred-and-one odd jobs around town. The 4-in-1 can immediately be converted to a Bulldozer, Skid-Shovel or Clamshell . . . and by just shifting the "shovel selector" lever into desired position.

See it work and you'll see the equipment savings your municipality can make. Your INTERNATIONAL Industrial Power Distributor will arrange your demonstration whenever, wherever you say. Call today so you'll have all the facts on this equipment that is big in performance, small in price.

CITY OF ROCKWOOD, TENNESSEE, uses new INTERNATIONAL DROTT 4-in-1 Skid-Shovel on sanitary fill and scores of other loading, dozing and materials handling jobs . . . finds its productivity matches bigger sized crawler and loader.

Now's the time to mail this month's Readers' Service card.

Fast-Moving, Big-Capacity Snow Loaders That Save Money All Year

In either the Athey Model 125 HiLoader, or the Athey Model 7-11 Force-Feed Loader, you have the fastest producing belt type loader available. Clearing snow or ice from busy city streets is a cinch for either machine but Athey loaders are engineered for top-notch performance at many other jobs — stockpile loading, materials handling, windrow loading to name a few. Result? One machine — one investment — give year 'round versatility and save money on every job.

As a snow loader, in St. Paul, Minnesota, the Athey HiLoader pictured above, loads up to 25 cu. yds. of snow per minute, doing the work of 4 or 5 ordinary loaders, or a big crew of hand laborers. It speeds to location at 20 MPH, then goes to work loading packed snow and ice, working close to curbs, doing a complete pick-up job without damage to the street surface.

Traffic tie-ups are eliminated because the full-swivel discharge conveyor loads directly to the rear, or 45° to right or left, permitting one lane or parallel loading. The HiLoader discharge height and conveyor length easily loads over the largest truck cab and sideboard.

As a materials handler, the HiLoader picks up loose material from a windrow and conveys it into trucks or casts it to either side. Typical jobs include loading berm trimmings, windrowed blacktop, rubble, dirt, gravel, leaves and other materials.

In stockpile loading the HiLoader has proven itself the highest production, lowest cost, belt-type loader, and switching from snow loading to stockpiling, the adaptable HiLoader needs no changes or additional costly equipment.

There are many more cost-reducing, time-saving advantages the Athey HiLoader or Force-Feed Loader offers you.

Get full details of this month's products . . . mail your Readers' Service card today.

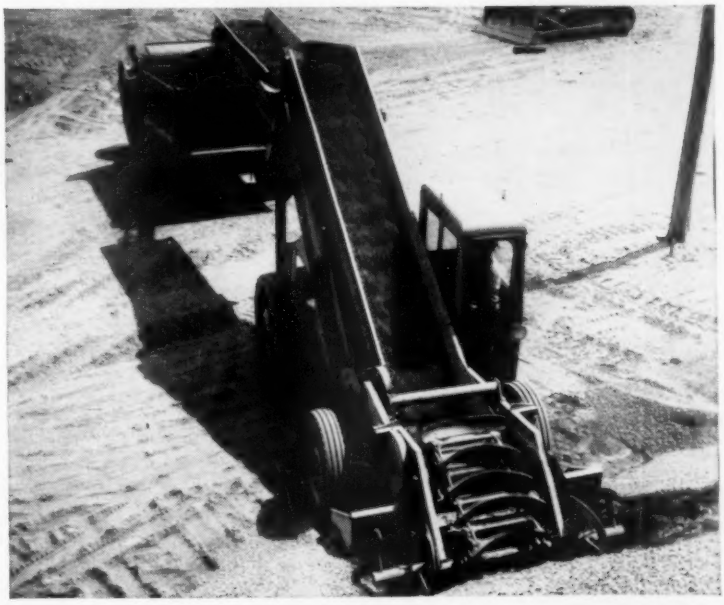
Fast, Complete Snow Removal

The Athey Force-Feed Loader handles up to 20 cu. yds. per minute, including ice chunks, trash and litter picked up in the snow.

The moldboards work right up to the curb ending snow-heaped curbs and parking troubles, and hydraulically controlled cutting edges skims off snow and ice right down to the street surface.

High-Speed, Low Cost Materials Handling

Stockpile loading records up to 4000 cu. yds. per day have been reported by HiLoader owners. Athey's patented full-floating feeder and the spiral augers do the job. Working as a team, they **carry** the material onto the main conveyor belt without "bulldozing" or shock loading. This speeds production to record highs and eliminates costly machine down-time.



Cut Road Maintenance and Rebuilding Cost

Are high material cost holding down a much needed program? The Athey Force-Feed Loader — Portable Breaker team can save more than 50% on the cost of resurfacing roads by renovating **in-place** materials. The loader picks up scarified blacktop windrowed materials and feeds it into the Portable Breaker where the material is reduced to a specified aggregate size and dropped behind the machine.

The material is then oiled, bladed and rolled — a finished road surface at a fraction of the cost of using new materials.

Call your Athey-Caterpillar Dealer today for all the facts.

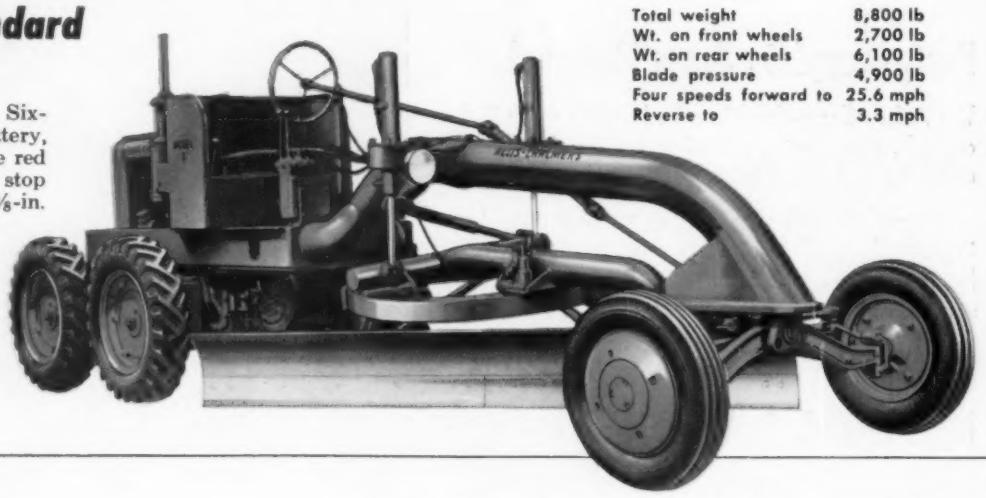
ATHEY PRODUCTS CORPORATION
5631 West 65th Street
Chicago 38, Illinois

Model D *Standard*

(GASOLINE ENGINE)

Standard Equipment: Six-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by 5/8-in. moldboard, hydraulic controls for moldboard lift, four 7.50-20 (6 ply) rear and two 6.50-16 (6 ply) front pneumatic tires with regular tubes.

Total weight	8,800 lb
Wt. on front wheels	2,700 lb
Wt. on rear wheels	6,100 lb
Blade pressure	4,900 lb
Four speeds forward to	25.6 mph
Reverse to	3.3 mph



Match your grading needs with

from the Allis-Chalmers model D motor grader line

Model D Diesel *Standard*

Total weight	9,350 lb
Wt. on front wheels	2,760 lb
Wt. on rear wheels	6,590 lb
Blade pressure	4,900 lb
Four speeds forward to	25.2 mph
Reverse to	3.2 mph

Standard Equipment: Twelve-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by 5/8-in. moldboard, hydraulic controls for moldboard lift, four 7.50-20 (6 ply) rear and two 6.50-16 (6 ply) front pneumatic tires with regular tubes.

Both gasoline and diesel Model D's are available with any combination of accessories.

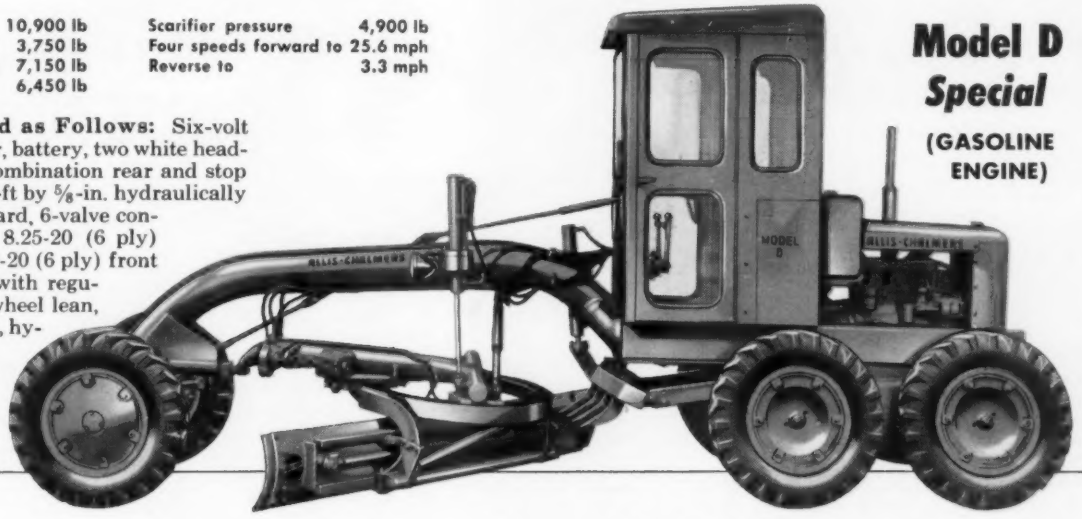
You can still buy a Model D for one-third the cost of a large motor grader, and it's the most popular, most versatile small grader on the market. In addition to the units illustrated, the Model D is available with other combinations of accessories . . . or with any of these useful attachments: rear-mounted 5/8-cu-yd loader; shoulder maintainer; one-pass windrow eliminator; V or blade-type snowplows. Ask your nearby Allis-Chalmers dealer for a demonstration . . . and prove the Model D's value to yourself.

Thousands use our Readers' Service card to keep up to date . . . do you?

Need more facts about advertised products? Mail your Readers' Service card now.

Total weight	10,900 lb	Scarifier pressure	4,900 lb
Wt. on front wheels	3,750 lb	Four speeds forward to	25.6 mph
Wt. on rear wheels	7,150 lb	Reverse to	3.3 mph
Blade pressure	6,450 lb		

Fully Equipped as Follows: Six-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by ⅝-in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 (6 ply) rear and two 8.25-20 (6 ply) front pneumatic tires with regular tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.



Model D *Special*
(GASOLINE ENGINE)

new economy and efficiency

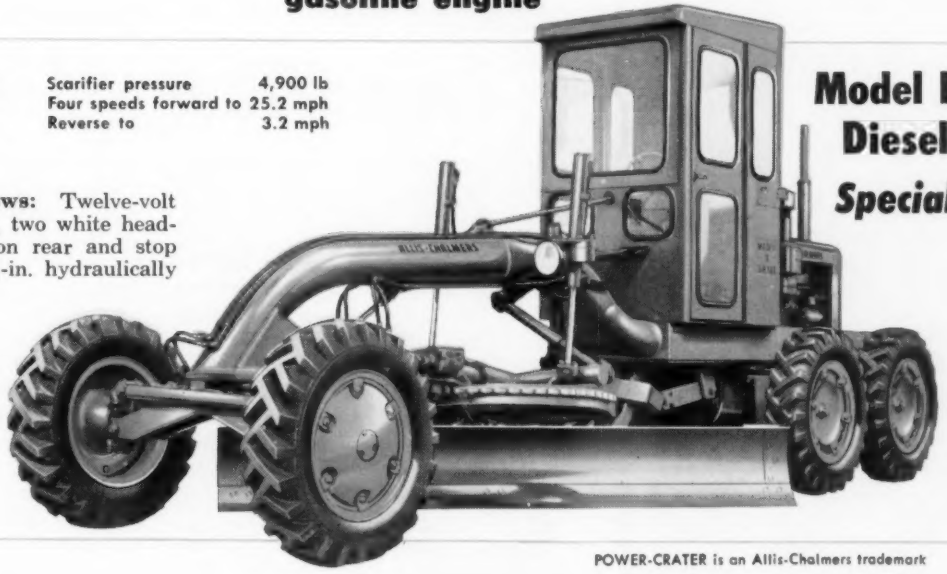
NOW AVAILABLE WITH YOUR CHOICE OF TWO OUTSTANDING ALLIS-CHALMERS ENGINES

50-hp POWER-CRATER gasoline engine

50-hp diesel engine with follow-through combustion

Total weight	11,450 lb	Scarifier pressure	4,900 lb
Wt. on front wheels	3,750 lb	Four speeds forward to	25.2 mph
Wt. on rear wheels	7,700 lb	Reverse to	3.2 mph
Blade pressure	6,450 lb		

Fully Equipped as Follows: Twelve-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by ⅝-in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 (6 ply) rear and two 8.25-20 (6 ply) front pneumatic tires with regular tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.



Model D Diesel *Special*

POWER-CRATER is an Allis-Chalmers trademark

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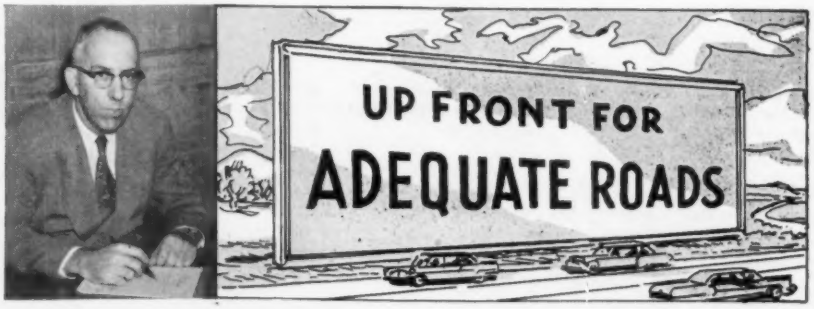


by LEO J. RITTER, JR.

Aerial Photographs — Announcements of the status of aerial photographs in the United States have recently come to our attention and are listed for the benefit of those interested in determining availability of photographs.

1) The Status of Aerial Mosaics, compiled by the U. S. Geological Survey, is shown by color overprint and county-state outline maps which show the mosaics that have been compiled by or for federal, state, and commercial agencies. Latest revision (Fourth) is dated January, 1955.

(2) The Status of Aerial Photography compiled by the same agency, is similarly shown. It shows all areas known to have been photographed by or for federal, state and commercial agencies. Latest revision (Seventh) is dated December, 1954.

(3) Items (1) and (2) above and other information are available from the Map Information Office, U. S. Geological Survey, Washington 25, D.C.

(4) The status of aerial photography for the Commodity Stabilization Service, Forest Service, and Soil Conservation Service, of the U. S. Department of Agriculture, is shown on state-outline maps available from the Performance and Aerial Photography Division, Commodity Stabilization Service, USDA, Washington 25, D.C. The latest revision is dated February, 1955 and shows (a) the year in which the latest USDA photographic coverage was obtained for each county or contract area in the specific state, (b) which one of the 3 USDA agencies has the coverage, and (c) areas now under contract for photography.

Rumbles—Cook County, Illinois has built a number of experimental installations of rough pavements on road sections immediately preceding stop signs. The idea is to cause a noisy rumble which will cause the driver to be alert, thus presumably reducing the number of drivers who run through stop signs inadvertently. Noisiest pavement tried thus far is composed of coated slag placed on the road with hot asphalt. The roughened section generally starts 150 feet from the stop sign and continues up to it.

Maintenance Costs —An analysis of costs incurred by the Missouri State Highway Department showed that 58 cents of every dollar spent on maintenence of the state system was spent on the roadway surface. Costs of keeping road surfaces in adequate condition averaged $431 per mile on the state primary system and $320 per mile on the state secondary (supplementary) system.

Federal Aid to Airports — At the time this is being written, hearings are being held on a bill to provide a greatly expanded program of federal aid for the construction of public airports. The bill was introduced into the Senate by Senator Mike Monroney of Oklahoma and provides authorization of $252 million during the next four fiscal years. A companion bill has been introduced in the House.

Passage of this bill would mark a long step forward in civil aviation in this country, since the amount authorized would far exceed that ever before available for federal aid to airports. During this fiscal year, $20 million of such aid have been available. It also would mark the first time that federal airport funds were available on a continuing basis, since such funds (when provided at all) have previously been available on a year-to-year program. If passed, local communities would be able to develop long-range airport improvement plans, since they would know the amount of federal money available.

There is little question that the money is needed, since the CAA has reported that about $600 million dollars is needed to complete the national airport program. A recent survey has also shown that approximately $173 million is *now* available

When the chips are down—

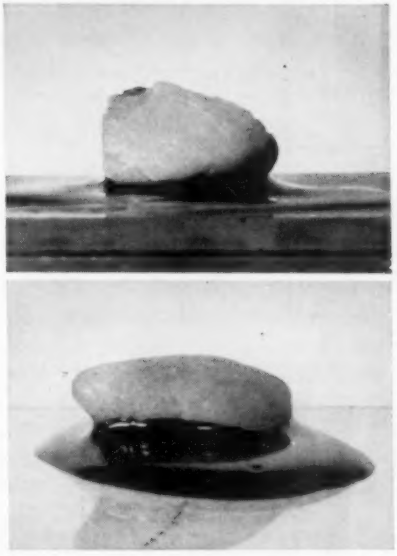
your best bet is BITUMULS®

ON SURFACE TREATMENT and light Armorcoat construction, you can be sure that cover chips are *down to stay* when they go down in Bitumuls. Bitumuls emulsified asphalt literally "climbs" high up on the individual chips, coating them with thin, strong films of pure asphalt. This means maximum cover retention.

In addition, Bitumuls provides an effective seal for the pavement, whether old or new, and assures a safe, non-skid wearing surface.

This superior performance plus the speed, ease and economy of using asphalt in emulsified form, makes Bitumuls the first choice of road-builders everywhere for surface treatment work.

Complete data and specifications on Bitumuls Surface Treatments and Armorcoats are available from our nearest office.



These laboratory photographs show the superior ability of Bitumuls to "wick-up" on the sides of cover chips. Top is a stone put down in an asphalt cut-back; lower, stone put down in Bitumuls.

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400% MORE PUMPING!

and LESS SHOCK
LESS WEAR
LESS STRAIN

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DIAPHRAGM PUMP
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THE BEST DIAPHRAGM PUMP *Ever Built!*

GORMAN-RUPP Firsts —— among all other diaphragm pumps of like size and type.

- Diaphragm drive rod spring-cushioned on down stroke. Runs smoothly. Increases diaphragm life **10 Times.**
- More Pumping — by as much as 400% at 25 feet static lift.
- Suction Accumulator provides continuous smooth flow of water.
- One man handling — engine driven pump only 130 pounds job-to-job. Motor driven 165 pounds.
- Easy hook-and-tighten fittings with hose connected.

See this pump at work on the job, through your Gorman-Rupp distributor. It is absolutely guaranteed to outperform and outlast any 3 in. single diaphragm pump comparably powered now on the market.

Ask for information bulletin 4-DR-11

NOTES FROM THE FIELD - -

Bridging Kokosing River on U. S. Route 36 at Mount Vernon, O. Model 3D-E1½ diaphragm pump and model 3362-B contractors' pump, both electric powered, and model 3205 contractors' pump engine powered -- On The Job.

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MANSFIELD, OHIO

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to state and local aviation agencies for matching federal funds. The bill may be in for rough sledding in this session, however, since the federal budget originally called for only $11 million of such funds for this fiscal year.

Concrete Paving Without Forms —The idea of placing and finishing Portland cement concrete pavements without the use of fixed side forms is gaining in momentum. Practical possibilities of the method have now been demonstrated on several large paving projects in various sections of the country. At least one commercial "slip-form" finisher has been placed on the market, by Quad City Equipment Company, Rock Island, Illinois. This particular machine is self-propelled and is provided with built-in slip forms which are adjustable for slab widths of 20 to 25 feet. The machine is supported by two 22-foot crawler tracks which walk on either side of the prepared subgrade. The slip forms extend the full length of the crawler tracks, and 16-foot extensions can be added, if desired. The machine reportedly produces a finished slab, no other finishers being necessary.

Traveling —This fat boy hasn't been doing too much traveling by car lately, time being what it is. However, I did go into downtown Cleveland at the height of the afternoon rush hour recently. Man, you talk about a traffic-regulated town; Cleveland is it. Off-center staggered lanes to accommodate rush hour traffic, no left turns at certain times, no right turns, no turns at all some places, no parking, no standing, no nothing. For a stranger, it's rough, although traffic seemed to be moving very well and I am sure the traffic people are doing a fine job. Our foul-up came in trying to reach a certain address (with the car) on East 11th Street in the heart of the business district; 11th Street there is about 2 blocks long and one-way the wrong way, naturally. Just like Boston, I could see it, but I couldn't seem to get there.

Publications —Speeches and discussions given at the National Conference on Highway Financing are summarized in a booklet entitled "Better Roads for Our Growing Nation", recently released by the Chamber of Commerce of the United States, Washington, D. C. ($1). BPR reports now available from the Superintendent of Documents, U.S. Government Printing

Model 450 shown

One mile of street swept for $1.00 or less per curb mile

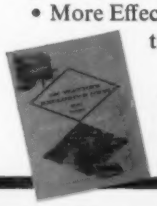
In terms of economy and efficiency, the vast superiority of power street sweepers over the old-fashioned push-broom method of street cleaning is clearly established by this one vital fact: A single, modern power sweeper can do the work of several crews with brooms at a *fraction* of the cost . . . and sweep *cleaner!*

And in over 600 nationwide cities, large and small, WAYNE STREET SWEEPERS are *proving* their dependability, ruggedness and superior *performance* under the severest conditions of climate, terrain and daily use year after year.

Sold and serviced in all principal cities

That's because Wayne clearly establishes its engineering superiority with these exclusive, advanced features:

• Broom Suspension enables Wayne to sweep depressions and rises with greater efficiency. • Rubber Drive Chains for dirt elevator provide longer, trouble-free operation. • Greater Power enables Wayne to sweep at traffic speeds, climb steepest grades, sweep more curb miles faster. • More Effective Hopper Capacity reduces trips to disposal points.



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World's Largest Producer of Power Sweepers for Cities and Industry

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MAKE YOUR
LAWN AREAS
"THE PRIDE OF THE TOWN"

E.W.T. SELECTIVE WEED-KILLER

Keep your lawn areas, seeded traffic islands and other improved areas the beauty spots they should be—with E.W.T. *Selective* Weed-Killer. Non-injurious to most grasses, but one spraying in economical solution (a cupful to 24 gallons of water) has proven successful for clearing rights-of-way of poison ivy, barberry, honeysuckle, poison sumac, locust, wild cherry and other persistant perennials and shrubs—including many species of common broad-leaved noxious weeds.

AND . . . WHERE NO VEGETATION WHATEVER IS WANTED . . .

DOLGE SS WEED-KILLER

Ideal for your parking areas and driveways, along fences and abutments. KILLS vegetation and wind-blown seeds on contact, then works down through the soil to the roots, sterilizing the surrounding earth. Here is truly effective, long-lasting protection against unwanted plant growth.

Please write for illustrated, easy-to-understand literature on scientific weed control. Your Dolge Service Man, too, will be glad to answer your questions.

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dependable DOLGE

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Greenlee Bolt Hole Treaters
assure maximum life for poles, piles, timbers
Prevent decay around holes bored in new or old poles and timbers by pressure-treating each hole bored in the field. It's a simple operation with a GREENLEE Bolt Hole Treater. Treats the *entire* hole . . . forces preservative into all the wood cells around the bolt hole. Simply pour preservative in Treater cup until hole and cup are full. Pull back on handle, spring return does the work. Two models. Write for details. Greenlee Bros. & Co., 1748 23rd Avenue, Rockford, Illinois.
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Office, Washington, D. C. (15 cents each) are *Needs of the Highway Systems, 1955-84*, House Document No. 120, 84th Congress, and *Progress and Feasibility of Toll Roads and Their Relation to the Federal-Aid Program*, House Document No. 139.

New Pedestrian Signs — The first of several hundred new-type pedestrian control signals have been installed at the intersection of Seventh Avenue and 34th Street, in midtown Manhattan (NYC). The signals are arranged so as to permit the pedestrian to see the "WALK" signal in green, followed by "DON'T WALK" in red, using the same "WALK" lettering. An additional feature is that 12 seconds before the end of the green period, the red "DON'T WALK" legend blinks on and off, thus warning the pedestrians that the light is about to turn against them. The signals are rectangular in shape, 24 inches wide, 18 inches high, and 11 inches deep.

People—Walter G. Johnson, secondary roads engineer of the Kansas State Highway Commission, has been named chief engineer. Dan C. Dees and Joseph W. Guyton have been announced as co-winners of the C. C. Wiley Traveling Award in Highway Engineering for 1955 at the University of Illinois.

This 'n That—The Euclid Division of General Motors Corporation is now producing limited quantities of the TC-12 Twin Power crawler tractor; powered by two diesel engines, this unit weighs 58,000 pounds and has a drawbar pull of 69,750 pounds as a bulldozer. A standard distress signal on the Garden State Parkway (New Jersey) is a handkerchief tied to the left-hand door of a car. The new, improved sealed-beam headlights will be factory-installed on new cars after July 4. This year's Nebraska state legislature killed the toll road authority of that state, created in 1953. Don't forget about the third annual ARBA national highway conference for county engineers and officials in Gatlinburg, Tennessee on September 12-14. Dates of ARBA's Annual Convention, which will be held in Miami Beach, now are January 11-14, 1956. The AMA estimates that taxes take 28 cents out of every dollar spent for the purchase of an automobile. Tennessee's stepped-up highway program is beginning to roll, with more projects being advertised by the Highway Commission in June than in any month in the last ten years.

QUICK INSTALLATION OF AMVIT JOINTED CLAY PIPE SOLVES SEWER PROBLEM FOR CAMDEN, N. J.

City Engineer
George Rogers

Assistant City Engineer
John Morgan

Contractor
C. & T. Affiliates, Inc.
John B. Kelly, President

New Amvit Jointed Clay Pipe saved considerable time and money for Camden, New Jersey.

The installation of this 15-inch sewer was done quickly and easily. The pipe was delivered ready for the ditch with the Amvit joint "built-in".

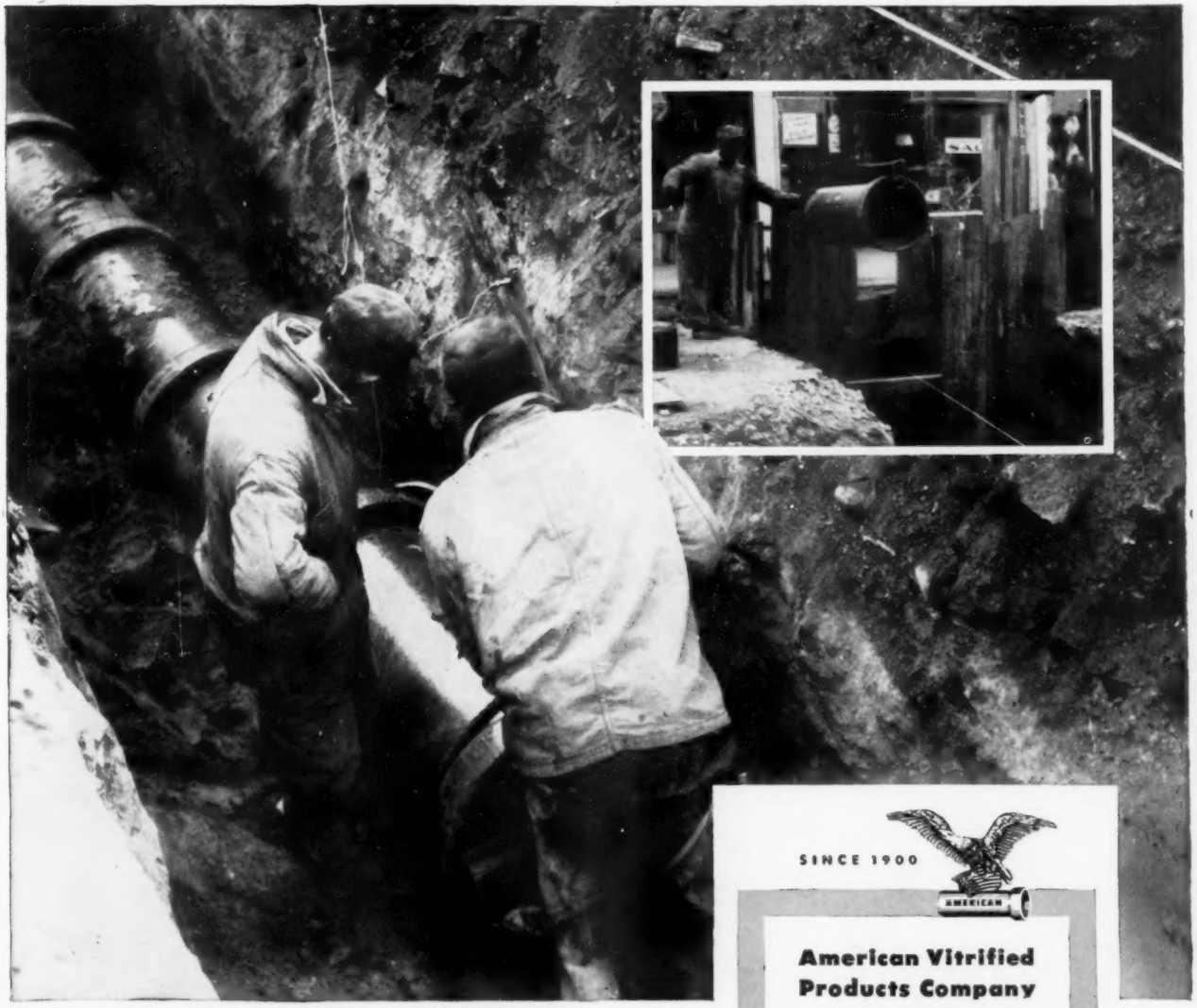
When the pipe is "pushed" together, the joint is in constant compression. Water cannot force its way in or out. Because this joint is flexible, immediate backfilling was possible.

Cut costs of *installed* pipe. Prevent costly infiltration. Stop pumping and treating thousands of gallons of ground water.

Specify easy-to-install, permanent Amvit Jointed Vitrified Clay Pipe.

Amvit Jointed Clay Pipe is just one of the many products manufactured in our plants across the nation. American Vitrified Products Company also produces concrete pipe, clay pipe, liner plates, flue liners and wall coping—both glazed and unglazed.

For more information, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.



The Amvit joint is made of a new acid resistant plastic material with rubber characteristics. Like the pipe, the joints will not be harmed by any condition of underground service. The pipe is simply pushed together. The trench is then ready for backfilling.

SINCE 1900

AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

Patent Pending

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Ford TRACTORS

Model 620 Ford Tractor, with 26.8 drawbar horsepower* and 134 cu. in. Ford "Red Tiger" engine. Available with built-in hydraulic system as Model 630. Heavy-Duty Loader illustrated is sold separately.

Model 820 Ford Tractor, with 35.0 drawbar horsepower* and 172 cu. in. Ford "Red Tiger" engine. Backhoe illustrated is used with transmission PTO, both sold separately.

***Manufacturer's Rating**

Get full details of this month's products . . . mail your Readers' Service card today.

Lowest-priced power for dozens of jobs!

Now your dollars work harder in a Ford Tractor! They buy more work horsepower—no extras unless you want them!

Yes, in Ford's new Special Utility Tractors you get the power you need for fast, efficient loading . . . low-cost hauling . . . easy 'dozing. You get features like famed Ford Tractor maneuverability . . . passenger-car ease of handling . . . exceptional operating economy.

And, new Ford Special Utility Tractors are lower priced—give you more horsepower per dollar. If you don't need power take-off, you can now buy a Ford Tractor without it.

Your nearby Ford Tractor and Equipment Dealer can tell you more about Ford's new Special Utility models . . . about how they can save you money in a loading or digging "package". He can also tell you how eight other new Ford Tractor models can be equipped to fit an extremely wide range of jobs. Just look him up in the Yellow Pages . . . then give him a call and get all the facts!

TRACTOR AND IMPLEMENT DIVISION

FORD MOTOR COMPANY

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No. 4* of . . .

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YOU SHOULD BUY AND USE
LOW-PRICED

HOMESTEAD
Lubricated PLUG VALVES

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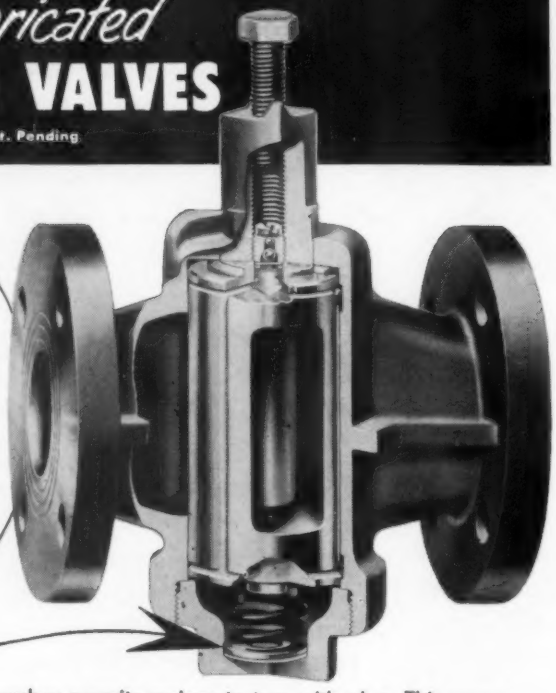

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Low friction Teflon washer permits springs to turn with plug. This means that less maintenance and longer life are assured, because the spring is subjected to compression only.

This is only one reason why you should **BUY AND USE,** low priced **HOMESTEAD LUBRICATED PLUG VALVES.**

HERE ARE ALL TWELVE

1. Extra long valve life assured by very close tolerance between sealing surfaces.
2. Straight line fluid flow—streamlined ports—minimum resistance to flow—minimum pressure drop.
3. Triple head seal—two lubricant rings and reinforced Teflon stem seal prevent leakage.
4. Easy turning—plug floated on Teflon washer and reinforced Teflon ring.
5. Leak-proof double ball and lubricant sealed check valve. No springs. No maintenance.
6. Full-threaded screw prevents dirt being forced into lubricant system.
7. Quarter-turn fully opens or closes.
8. Reinforced Teflon stem seal—no cold flow—continuous, positive seal.
9. Seating surfaces protected in both open and closed positions.
10. High pressure lubricant system provides full lubricant seal around ports.
11. Self-freeing plug prevents sticking.
12. Two lubricants handle most services.

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"Serving Since 1892"

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Thousands use our Readers' Service card to keep up to date . . . do you?

★

B. A. Crocker is City Engineer of the City of Longview, Texas, moving there in 1940 from Sherman where he had been Assistant City Engineer and then City Engineer. During his service at Longview, the population has increased from 15,000 to 40,000; sewer lines have grown from 14 miles to 100 miles; and water lines from 41 to 129 miles. Most of this work was done by City forces, under Mr. Crocker's direction. Other improvements include a million-gallon elevated water tank, with another of the same size now under construction; a new water treatment plant; and a new sewage treatment plant.

Mr. Crocker is one of those rare birds, a native Texan, and he attended the Engineering School of the University of Texas as well as Austin College, from which he received a BA degree. He taught school seven years before entering on his engineering work. Last spring he completed a most successful year as President of the Texas Water & Sewage Works Association which holds its annual Short School at College Station.

If you look closely at the front cover picture you will note Roman numerals and a clock dial on Mr. Crocker's tie. His hobby is collecting and repairing clocks and he is a member of the National Watch & Clock Collectors Ass'n. Aside from that he belongs to the AWWA, the FSIWA and the TSPE. He is a Baptist, a Mason and a Lion; he did a fine job of running the recent Short School, just as he has done an excellent job over the years in taking charge of the engineering work for Longview.

How this hydrant

PAYS A BONUS!

It's unique...it's the B-50-B

EVERY new installation of Darling B-50-B A.W.W.A. Hydrants . . . proves the advantages this new hydrant offers you.

Darling's ball bearing design cuts required operating torque more than 50%—an important factor in *any* system. Action is easy, smooth and sure!

Darling "O" ring seals provide a *dry-top, packless* hydrant, minimizing service and maintenance needs and eliminating the hazard of water reaching the operating threads.

This operating surety and low-cost performance of Darling B-50-B hydrants are bonus values that just can't be matched. You can get the B-50-B design in a wide range of Darling hydrant types to meet your particular installation requirements.

Send for Bulletin 5403

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Williamsport 22, Pa.
Manufactured in Canada by
The Canada Valve & Hydrant Co., Ltd., Brantford 7, Ontario.

TRADE ® DARLING MARK

Here, there'll be...

NO CORROSION

NO JOINT-LEAKS

NO DANGER OF FAILURE

PROJECT: Waste Disposal Line for Esso Standard Oil Company Baltimore Refinery, Baltimore, Md.
ENGINEER: (For Esso Standard Oil Company) Mr. James B. Vason
CONTRACTOR: The Leo Butler Company, College Park, Md.

IT'S *Universal*

VITRIFIED, TYLOX *Flexible-Coupled* PIPE!

As on so many important sewerage, drainage and industrial waste disposal jobs, UNIVERSAL Vitrified Pipe and TYLOX Gaskets "join up" to assure long-time, maintenance-free operation of this 24" line shown under construction at the Baltimore refinery of Esso Standard Oil Company.

Engineers and officials of this project can be assured of the wisdom of their specifications . . . petroleum by-products, nor any other corrosive elements common in sewerage and industrial waste lines, cannot deteriorate Universal Vitrified pipe, and the equally durable TYLOX Gaskets assure "no joint-leaks" for the life of the line.

In planning **your** pipe projects, take advantage of UNIVERSAL'S unbeatable combination for deterioration-proof, maintenance-free sewers and drains — Vitrified pipe and TYLOX Joints. Write us for more details, or contact the Universal-United States Concrete branch office nearest you.

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Vitrified Pipe and Fittings, Concrete Pipe, Vitrified Liner Plates, Ship Lap Wall Coping and other Clay Building Products.

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Now's the time to mail this month's Readers' Service card.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

TRENCHING 7 MILES of Indianola Avenue, a heavily traveled thorofare in Columbus, Ohio, called for a fast-moving job. The first step in opening the ditch was to line-cut and break a 7″ course of paving brick topped with asphalt. Two 80 lb. breakers, powered by a Jaeger "125" Roto Air-Plus, were used for this work.

How Jaeger "125" Rotary speeds street work

On the above job, the instant-acting control of the Jaeger rotary, enabling it to maintain 100 lbs. minimum pressure under all air demands up to 125 cfm, made it possible to run two 80 lb. breakers at full efficiency, cutting and breaking an average of 400 linear ft. of 3 ft. wide trench (1200 sq. ft.) each 8 hours.

Because the higher efficiency of the Jaeger Roto enables it to operate at more economical engine speeds, fuel consumption on this job averaged only 1½ gallons an hour.

For big work, equally high efficiency is offered in the Jaeger Model 600 rotary. Jaeger reciprocating type compressors also continue to be available in all Jaeger "new standard" ratings with the exception of the 600 cfm size. For full information and comparative prices, see your Jaeger distributor — or send for Catalogs JC and JCR5.

For big work, Jaeger offers the Roto "600", illustrated below. It is the first fully efficient 600 cfm rotary compressor.

Model 600 Roto Air-Plus

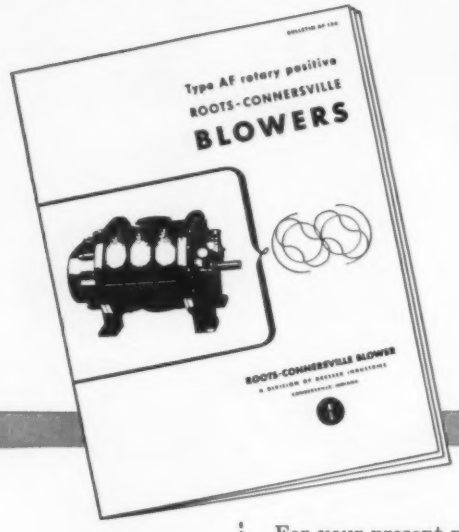
THE JAEGER MACHINE COMPANY

400 Dublin Avenue, Columbus 16, Ohio

PUMPS • CONCRETE MIXERS • TRUCK MIXERS • LOADERS • PAVING MACHINES

Get full details of this month's products . . . mail your Readers' Service card today.

Send for new information on R-C Rotary Positive Blowers



CHECK THE "BIG 4" ESSENTIALS

1. Accurate volume at required pressure
2. High efficiency—low operating cost
3. Low maintenance cost —low down time
4. Freedom from oil or oil vapor contamination

Check your present blowers and if they don't measure up, it may be an economy to replace them with modern R-C equipment.

For your present needs, or for future reference, you'll find highly useful information on the smaller sizes of Roots-Connersville Rotary Positive Blowers in this new Bulletin No. AF-154.

Especially important are the tables showing sizes, pressures, capacities and other characteristics to help you select blowers for specific applications.

You'll also find included factual data which points out why R-C Blowers meet the "BIG 4" essentials of successful performance.

If your files are not complete on other Roots-Connersville equipment for handling air and gas, ask for bulletins on:

Centrifugal Blowers and Exhausters . . 120-B-14
Positive Displacement Meters . . M-152
Gas Pumps (small) 31-B-17
Gas Pumps (large) 32-33-B-13
Spiraxial Compressors. SC-354
Vacuum Pumps 50-B-13
Inert Gas Generators 100-B-14
Rotary Positive Blowers (large sizes) . . RB-254

For any problem of handling gas or air, consult Roots-Connersville, now in their second century of building such equipment, exclusively.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.
455 Poplar Ave. • Connersville, Indiana
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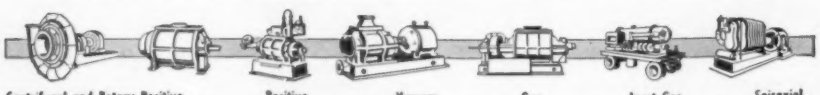


Centrifugal and Rotary Positive Blowers and Exhausters • Positive Displacement Meters • Vacuum Pumps • Gas Pumps • Inert Gas Generators • Spiraxial Compressors

Need more facts about advertised products? Mail your Readers' Service card now.

A FILE SYSTEM FOR MR. JENKINS

I read of your request for information on City Engineering Filing System in Public Works for June, and I thought you might be interested in our methods. This is a subject which I feel is of primary importance to successful administration of City Public Works.

I have adopted a system which I understand is used by Consulting Offices. The main components of the system are as follows.

1. *Project Number Card File*: All projects are given a number, the first two digits of which are the year in which the Project was set up. These cards are filed in yearly groups.

2. *Project Portfolio* File: All projects are given an envelope and a tab with the Project number. These envelopes are legal size, 12½″ x 9½″. All correspondence, loose leaf field notes, computations, estimates, etc., pertaining to the Project are filed in these envelopes. This gives a "single location" for all material about the job. These are filed by years, and should be kept in a fire resistant file.

3. *Vertical Plan File*: All completed plans are filed by the year in a vertical type file and each group is numbered and bound by two wood strips.

4. *Vertical File Card Index*: This card index is arranged alphabetically by Streets and Avenues. The street card contains information on (a) Nature of improvement; (b) Job number; (c) Vertical File Number.

5. *Contract File*: This file contains the office copies of each contract which has been let. The contracts are filed by description and are grouped by year in which it is let.

Some of the many advantages of this system are as follows: (1) All information on each project is concentrated at one point for ready reference in the Project Portfolio.

(2) The system of loose leaf field

In ALABAMA (and across the nation)

it's LOAD-PACKERS® 13 to 1

Here's the Score in Alabama!

Out of 127 modern enclosed-type refuse collection units, serving 23 Alabama communities, *118 are Gar Wood Load-Packers!*

This overwhelming preference — echoed by over 2600 cities throughout America — is based on the simple fact that Load-Packers provide the *most efficient collection system at the lowest net cost per year, per tax payer.* Sanitation officials everywhere praise Load-Packer's ability to load both garbage and trash, without need for selective loading. Where large-capacity bodies are required, they see the added economy of Load-Packer's *"dual thrust" compaction,* which insures up to 200% more payload in the same size body. And they prefer the added safety of Load-Packer's low, easy-to-load hopper, with fool-proof controls, and complete absence of dangerous revolving parts.

Now, with 22 brand new improvements for '55 — including *instant automatic cycle control, faster hopper opening, and simplified hydraulic system,* the preference for Load-Packers is greater than ever. For a free demonstration on *your* routes, call your local Gar Wood Distributor or branch *today.* Gar Wood Industries, Inc., Wayne, Mich., Richmond, Calif.

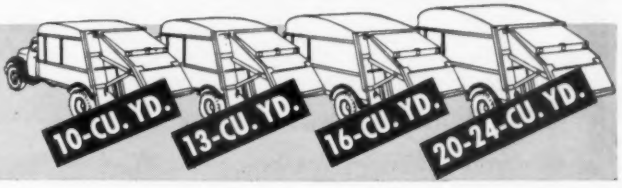
Load-Packer® is a Registered Trademark of Gar Wood Industries, Inc. GW-LP-9

CITY	POPULATION	LOAD-PACKERS	COMPETITIVE LOADERS
Anniston	31,150	5	0
Atmore	5,751	1	0
Bessemer	28,471	2	0
Birmingham	298,720	34	1
Brewton	5,157	0	1
Cullman	7,524	0	1
Dothan	21,556	3	0
Elba	2,934	1	0
Fairfield	12,219	2	0
Florence	23,832	0	3
Gadsden	55,528	11	1
Guntersville	5,269	0	1
Homewood	12,808	1	0
Huntsville	16,406	5	0
Mobile	127,151	18	0
Montgomery	105,098	18	0
Mountain Brook (Suburb of Birmingham)	3,000	2	0
Opp	5,212	1	0
Ozark	5,244	1	1
Sheffield	10,728	3	0
Sylacauga	9,618	3	0
Tarrant City	7,560	1	0
Tuscaloosa	46,364	6	0
	TOTAL	118	9

GAR WOOD GW INDUSTRIES

LOAD-PACKER®

America's Most Popular Refuse Collection-Unit



Thousands use our Readers' Service card to keep up to date . . . do you?

notes and job portfolios is very efficient when coordinating the field survey crew with the design force.

3. The vertical card index and plan file are used mostly for permanent record and when referring to work done in the past. These files are kept in the vault.

4. The system of Project Numbers lends itself very well to cost accounting as all time, materials, labor, etc., can be charged to the job and good records kept of the cost of each project.

Other files which we use and which are very essential are as follows: (1) Project Cost estimates to the City Manager. (2) Contractor's monthly estimates. (3) Tabulation of bids. (4) Plans pending completion file. (5) City Plat tracings file.

6. Standardized Specification File (contains mimeographed copies of standard specifications for rapid assembly of routine contracts).

7. Annexation plat file.

I hope that this outline is of some assistance to you in setting up your filing system.

R. O. Folland
Director of Public Works
and City Engineer
Albert Lea, Minn.

"...And, we like your new catalog. It helps to have the entire story on a line as complete, and competitive, as Grote's!"
There's a GROTE SIGN for every signing need!

GROTE ENAMELED SIGNS are made of heavy gauge, rustproof steel . . . finished with three coats of enamel, each separately baked. No chipping, cracking, spall! Letters are screen processed. Attract motorists' attention instantly . . . easily, quickly read!

GROTE REFLECTORIZED SIGNS have Grotelite SS reflective sheeting on aluminum or steel. Provide maximum target value . . . greatest advance warning to motorist. Made of optical acrylic plastic, Grotelite sheds water, withstands all weather extremes.

* *Grotelite SS is also available in sheets, precut to size . . . in yellow, red, green and silver (white).*

Send Today for Catalog No. 754-T . . . and for Complete Facts on Grote's Reflectorized and Enameled Signs.

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SHOULDN'T YOU EXAMINE THESE FACTS ON GROTE SIGNS?

- **Maximum Attention Value!**
- **More Years of Effective Service!**
- **Extra Strength and Durability!**
- **Guaranteed Waterproof, Colorproof Finish!**
- **Complete Sign Line!**

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ESTABLISHED 1901 • BELLEVUE, KENTUCKY • OPPOSITE CINCINNATI

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

MANUAL FOR SEWAGE PLANT OPERATORS

We get a good many requests for training texts for sewage plant operators. Here is a good one—the best now available so far as we know. Though prepared primarily with the problems of the Southwest in mind, it will help any operator to prepare for a licensing examination or to do a better job on his sewage treatment plant. Also, it goes beyond the immediate problems of the plant itself and shows the operators how proper sewer design, sewer cleaning and sewer maintenance are factors in, and important to, good operation.

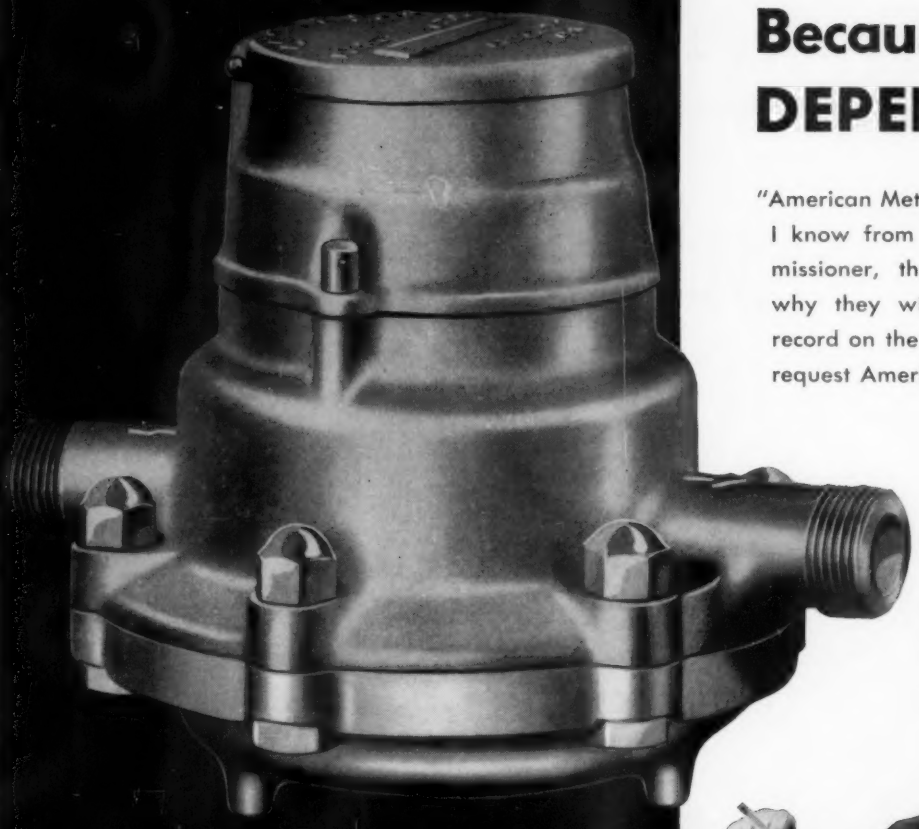
There are 27 chapters and 5 appendices. Of special interest and value are the chapters on Sewer Design, revised by Prof. Jim Baty of Texas A&M; Lift Stations and Sewage Pumps, a troublesome phase on which all of us need information; Sewer Maintenance by Usher Andrews and A. B. Carson, Jr., of Fort Worth; Screens, Grit Chambers and Grinding—another difficult phase of plant operation; Imhoff Tank Design and Operation; Primary Sedimentation Tanks; Chemical Precipitation of Sewage; Oxidation Ponds; Trickling Filters; Operation of Activated Sludge Plants; Separate Sludge Digestion; Sludge Filters and Driers; Chlorination of Sewage; Sewage Treatment Plant Maintenance; Laboratory Control Tests; and Mathematical Problems in Sewage Treatment—and how to work them.

This list of chapters is by no means complete; nor is it possible to show, in this review, how well the various operational problems are covered from the needs and viewpoints of the operator.

Following many of the chapters are lists of useful references. One criticism of the text is that in perhaps a majority of cases, these lists have not been brought up to date; they are the same as the ones that appeared in the first edition.

Clayton H. Billings has done a fine job as editor, far better than one would normally expect in a publication of this kind where some 29 men of various writing aptitudes prepared the various chapters. Coordination and continuity are good. There are 496 pages, with a good number of pertinent illustrations. Prepared under the auspices of the Texas Water & Sewage Works Ass'n you can get full information from The Bureau of Sanitary Engineering, State Dep't. of Health Austin, Texas.

The Safest Meter to Buy is AMERICAN



Because It's DEPENDABLE

"American Meters have proven themselves. I know from experience as Water Commissioner, that they stand up! That's why they will help me make a good record on the job. I'll always be safe if I request American."

In a million homes, American Meters are doing their job day after day, year after year, silently, dependably. It's the kind of trouble-free service you expect from American Meters and it's the kind of service you get. No wonder then that water department heads who wish to make a good record, take no chances but choose the safest meter they can buy, American.

BUFFALO METER CO.

2920 MAIN STREET • BUFFALO 14, N.Y.

Now's the time to mail this month's Readers' Service card.

COMING SOON!

the

MILWAUKEE SHOW

October 2-5, 1955

★

For Exhibit Space and Further Details Write to the

AMERICAN PUBLIC WORKS ASSOCIATION

1313 E. 60th Street

Chicago 37, Illinois

(The surrounding pictures were selected by the Association at random from those taken at last year's show.)

Get full details of this month's products . . . mail your Readers' Service card today.

Now...

from Caterpillar

...a major

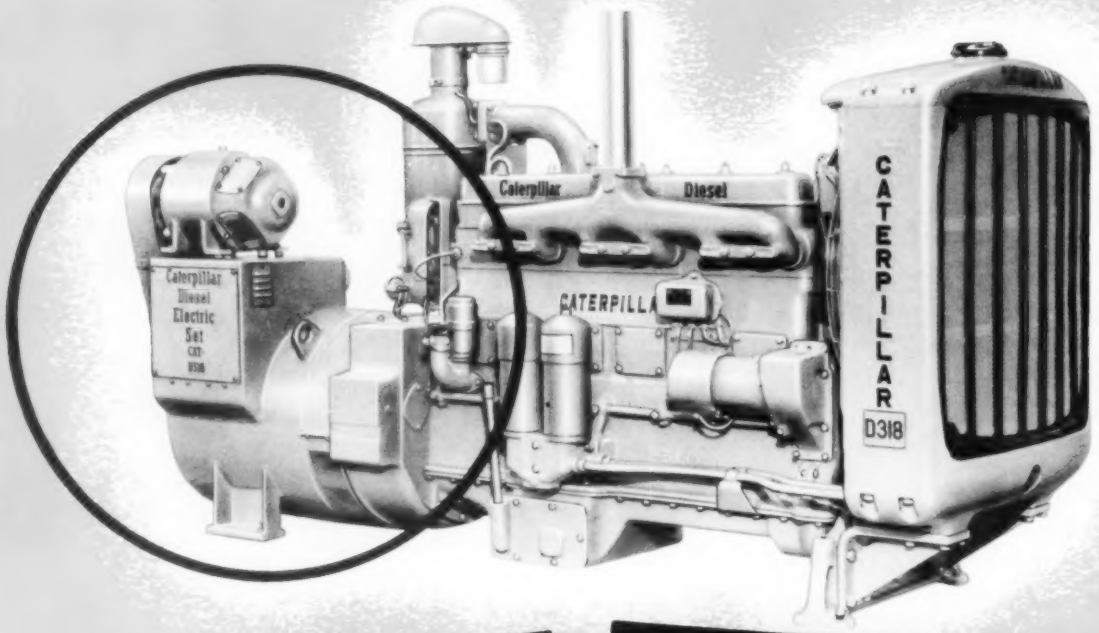
development

in

MODERN ELECTRIC POWER

The new

CATERPILLAR



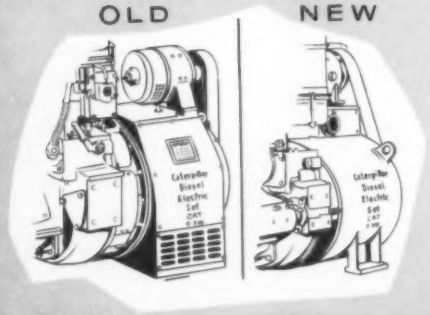
Nothing like it for simple operation, flexible application, compact power, rugged construction, long life and ease of maintenance.

Heart of the new line of Cat Diesel Electric Sets, providing in one package the best features of self-regulated and externally-regulated generator plants—you get more for your money.

Easily paralleled with other generators now in use.

There is a big difference in size between the old and new Caterpillar Generators.

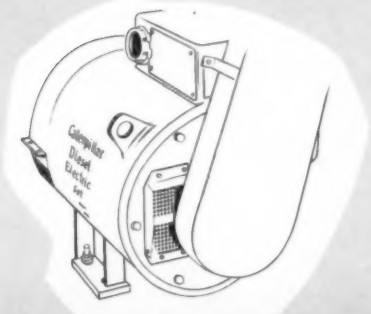
OLD NEW



New insulation permits more compact design—exaggerated comparison in illustration below.

OLD NEW

New design saves space. Leads can be taken from side, back or top without affecting machine width.



GENERATOR

Here is a new concept in generators – an advance that stems both from Caterpillar research and practical experience in the field of electric power.

Combining latest developments in design, materials and production, it brings to Caterpillar's new line of Diesel Electric Sets the efficiency of the externally-regulated set in a self-regulated set–you get more for your money.

These rugged power packages provide you with many new advantages. Here are a few of many features that add up to a new standard of efficient, economical performance:

- **Close regulation of voltage—no load to full load.**
- **Easy to start—require no operating adjustments. Anyone can run them.**
- **Extremely compact—big electrically, packing more power in smaller space than old style units.**
- **Easily paralleled with other generators now in use.**
- **Like all Caterpillar-built equipment—100% backed by Caterpillar.**
- **Sold and serviced by one reliable source—your nearby Caterpillar Dealer.**

Whatever your power requirements, it will pay you to look into the new Cat Diesel Electric Sets with their advance-design generators. Get the full facts about them from your Caterpillar Dealer.

MAJOR ADVANTAGES OF THE NEW CAT GENERATORS

1 **MATCHED TO ENGINE PERFORMANCE.** Each Cat Generator is designed and built to exactly match the Cat Engine powering it, assuring maximum efficiency in a simple, complete package.

2 **SELF-REGULATING, WITH CLOSE VOLTAGE REGULATION.** Designed to meet the needs of applications now served by self-regulated or externally-regulated generators, this new generator provides steady voltage from no load to full load.

3 **ADJUSTABLE FOR SPECIAL CONDITIONS.** During initial installation, the terminal voltage and voltage "droop" can be adjusted to meet the special conditions of the application. After that, the adjustments are locked and no further adjustments are necessary.

4 **EASY TO INSTALL.** No complicated switchgear or external voltage regulators are needed.

5 **VERSATILE IN APPLICATION.** Easily paralleled with other generators now in use.

6 **SMALL AND COMPACT.** Occupy less space than other generators. A reduction in frame size, close coupling, top-mounted exciter results in a shorter over-all package length.

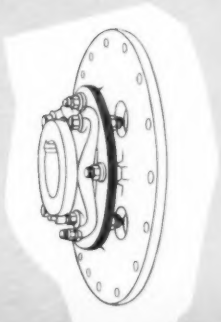
7 **BIG ELECTRICALLY.** Motor starting ability — capacity to handle the surge of heavy loads.

8 **EASY TO MAINTAIN.** Heavy-duty, single-bearing, close-coupled construction. The single bearing is easily accessible and is lubricated from an oil reservoir that requires filling only once a year.

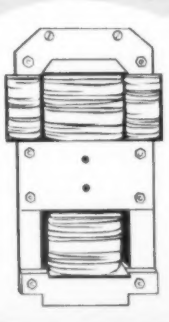
9 **RUGGEDLY CONSTRUCTED.** Heavy-duty, laminated pole rotor for improved operation and increased rotor life.

10 **DESIGNED FOR LONG LIFE.** Built to match the long life of the Caterpillar Engine powering them.

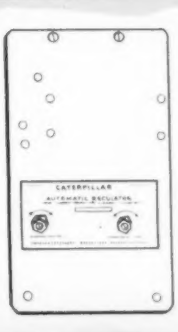
Disc-type coupling and single-bearing design save space. Single bearing is easily accessible.

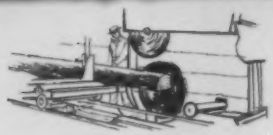
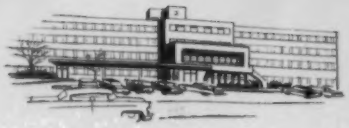
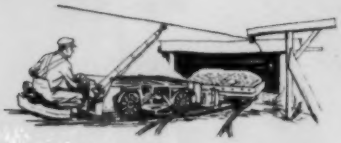


The "regulator" of the Caterpillar Generator. No moving parts — compact — reliable.

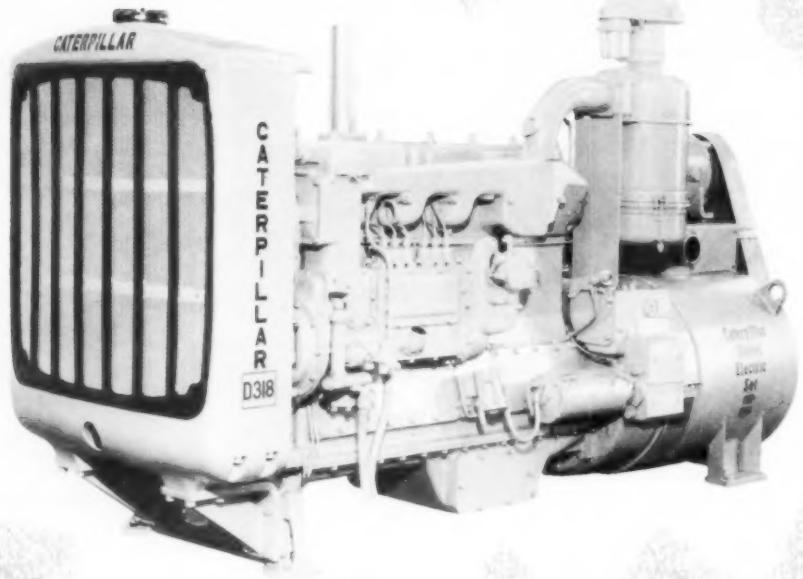


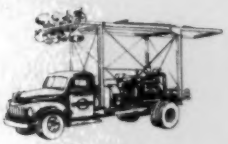
The control panel—adjustments locked at installation. No further attention required.



The new CAT* Generator





. . . another example of Caterpillar leadership in action

In 1939, Caterpillar introduced the first Cat self-regulated Electric Set.

At the time, this was a new concept in diesel-electric power.

Like most new developments, it had to win acceptance against "old, hidebound, traditional prejudices and practices."

It won acceptance — quickly and with outstanding success!

Just look at the record: since 1939, thousands of Cat Electric Sets have delivered long, reliable, economical service in widely different applications in every corner of the world. Sets with many thousands of hours of profitable operation are not uncommon. Many with more than 100,000 hours on their meters are still in use and going strong.

No matter how old they grow, not a single one ever becomes a "parts orphan." Like every Caterpillar-built machine, genuine Cat parts will be available as long as you have a need for them.

Now Caterpillar introduces another new concept in diesel-electric power—a new and better generator, heart of the new line of Caterpillar Diesel Electric Sets.

Like that 1939 "new concept of diesel-electric power," this is also backed 100%.

New design, new materials and new production techniques have made it possible for you to get more for your money in the new power packages.

See your Caterpillar Dealer about the new line today!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Cat and Caterpillar are Registered Trademarks of Caterpillar Tractor Co., U. S. A.

NEW HEAVY-DUTY ELECTRIC SETS

MAIL TODAY!

CATERPILLAR TRACTOR CO., Peoria, Illinois, U. S. A.

I'd like more information on the new Cat Generator.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

PRINTED IN U. S. A.

BROS *tip sheet* EXTRA

50 HP, TORQUE CONVERTER DRIVE, FULL OSCILLATION FEATURED IN NEW BROS SELF-PROPELLED ROLLER

MAT RESURFACING, SEAL COAT JOBS AND SHALLOW LIFT COMPACTION... DONE SMOOTH AND FAST BY BROS SP-54!

Minneapolis, Minn. "This sonuvagun is just what I've been looking for in a pneumatic tire roller!"

... That's the standard reaction from the many road contractors who've gone over the new BROS self-propelled 5 x 4 pneumatic tire roller with a fine tooth comb.

Backed by special design and exhaustive testing, the SP-54 is unquestionably the nigh perfect machine for mat resurfacing, seal coating and compaction jobs in the shallow lift range. And it's easy to see why:

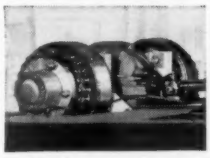
Torque converter drive, 3-speed transmission and shuttle gear provide the smooth, high maneuverability needed for the exacting compaction results being specified these days. Combined with the 50 hp engine, you've got a smooth flow of real power at 0 to 18 mph speeds — both forward and reverse.

Shuttle speed feature of this new roller saves time by eliminating turn-around on short road beds. It eliminates the bugaboo of tipping over chips frequently done by tow tractors — in fact, it saves cost of tractor, too!

FULL OSCILLATION

Here, take a look at the full oscillation of all wheel pairs on the SP-54. This feature is engineered into the front wheel pairs as well as the rear for even load distribution for uniform compaction densities... 2,000 lbs. per wheel or 265 lbs. per lineal in. of rolling width.

POSITIVE CHAIN DRIVE

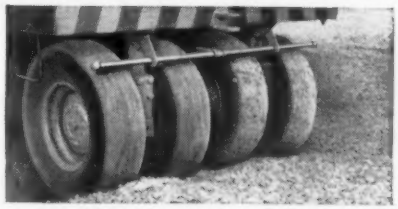


Tractive effort is maximized by positive chain drive to *all* rear wheels. Dual chain drives smoothly transmit drive power so there's no wheel spinning or tearing up seal coat surface.

FORE AND AFT VISIBILITY

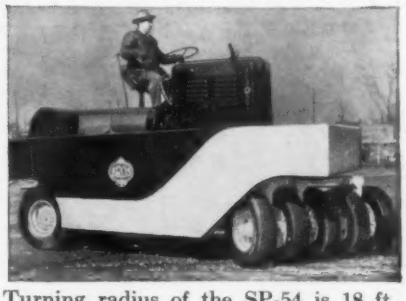
In both forward and reverse, the operator sees and knows exactly where he's at... another example of how steady, uniform compaction work is inherent in the SP-54's design. Note easy accessibility of shut-off valves under operator's seat for optional front and rear water sprinkler bars.

DOUBLE BRAKING, NO "DEAD WHEEL" IN REAR



Hydraulic brakes on both rear wheel pairs can be operated simultaneously or separately — as you see here. Loss of tractive effort on one wheel pair is quickly corrected by braking it; this transfers needed drive power to other pair. As is obvious, there's no "dead" wheel to get unit "hung up" on extreme surface contours.

18 FOOT TURN AROUND



Turning radius of the SP-54 is 18 ft., 5 in.; faster job completion because there's no lost motion — busy from morn til night. The SP-54 is built by BROS, the world's largest manufacturer of pneumatic tire compaction equipment.

So get in on lower compaction costs and the best results possible — *right now*. For complete information, write: The Wm. Bros Boiler & Mfg. Co., 1057 Tenth Avenue S.E., Minneapolis 14, Minnesota.

100% COVERAGE

One-half in. overlap of wideface front and rear tires provide solid coverage over entire surface. Drawing shows overlap and the flow of compaction exerted to knead out surface voids. On seal coating, this BROS "first" correctly imbeds sand without any grinding or crushing action.

EASY HANDLING BY HYDRAULIC STEERING

UNIFORM hydraulic steering of the SP-54 gives you sure, smooth control at all engine and roller operating speeds. High turning angle for easy turn around.

FREE EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

NEW LISTINGS

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the coupon, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

A Clamp That Fits Pipe Regardless of Irregularities

78. A clamp that can be used on either asbestos-cement or cast-iron pipe is described fully in a four-page bulletin just released by the Dresser Manufacturing Division, 69 Fisher Ave., Bradford, Pa. Complete instructions are given as to how the clamp is put on the pipe, along with a price list of the length and size of clamp desired. Just check the coupon.

Removing Grit From Sewage and Trade Wastes

80. The 20-page bulletin on the modern method for removing grit published by The Dorr-Oliver Company, Barry Place, Stamford, Conn., provides detailed description of the design and operation of The Dorr Detritor. Pertinent facts concerning the types, special designs, advantages, principle of design are included. Check the coupon for your copy of Bulletin #6411.

The Tampo Rubber-Tired Self-Propelled Roller

150. Information on the Tampo self-propelled roller can be had from Tampo Manufacturing Co., 1146 W. Laurel Street, San Antonio, Texas. The advantages of using this roller and complete general specifications are outlined. Optional equipment for the machine is listed. Check the coupon.

Catalog on Industrial Tractor and Equipment

160. Specifications for the John Deere "40" crawler and "40" utility and standard wheel tractors, together with equipment for loading, dozing, mowing, sweeping and many other operations are covered in a 20-page, two-color folder-catalog, issued by John Deere, Moline, Illinois. Get your catalog by checking the coupon.

Sweco Separator for Every Screening Need

195. A catalog which features photos, drawings and detailed specifications of equipment for industrial wastes has just been released by the Southwestern Engineering Company, 4800 South Santa Fe, Los Angeles 58, California. Applications for many typical industries are outlined. Check the coupon today.

Propeller Type Meters For Measuring Liquid Flow

107. A twelve-page color bulletin on complete line of Propelloflo Meters, a direct-reading, propeller type instrument for metering water and other liquids is now available. General information on description, specifications, types, installation dimensions and operation of meters are included. For your copy of Bulletin 380-K4A write Builders-Providence, Inc., 345 Harris Ave., Providence, R. I., or check the coupon.

A Tractor-Air Compressor Unit

140. "Around the Clock, Around the World" is the title of an 8-page bulletin describing Le Roi's new 125 Tractair, a self-propelled compressor unit with flexible tractor power. Applications, uses, attachments and tools, design and specifications of the compressor and engine are listed. Write Le Roi Division of Westinghouse Air Brake Company, 1706 South 68, Milwaukee 14, Wisconsin, or check the coupon for your copy.

The Dilemma of Our Present Highway System

314. "Where Do We Go From Here?" is the title of the new 16-page booklet produced by Caterpillar Tractor Company, Peoria, Illinois. Many highway problems are discussed in the interesting and informative booklet. Inadequate and obsolete highways, financing of free roads and toll roads, and whether to construct free roads or toll roads are a few of the topics. A section is devoted entirely on the story of modern highways from the planning stages through the construction stages to the finished roadways. Check the coupon for this booklet.

Galion 503 Tandem Drive Economy Grader

145. A sixteen-page catalog #380 has just been released by The Galion Iron Works & Mfg. Company, Galion, Ohio, describing the numerous construction and operating features of the Galion Model 503 Motor Grader. Optional equipment includes hydraulic shiftable moldboard, front-end scarifier, "V" and straight snow plows, rear-end bucket loader and bulldozer. Check the coupon.

Valuable Information on Water And Waste Treatment Instrumentation

229. Helpful data on pneumatic instrumentation, flow measurement, recording controllers and rapid sand filter control systems are included in a 16-page Bulletin 1-15. Get this from the Foxboro Co., Foxboro, Mass., or by checking the handy coupon.

Get Water Clarity With Celite Filtration

231. In a handsome 12-page booklet, Johns-Manville, 22 East 40th St., New York 16, N. Y., explains how Celite diatomite filter aids remove colloids and other suspended impurities. Cites representative installations where Celite is being used and includes examples of interest to sanitation, plant and power engineers, and other operators of any business interested in water clarity or elimination of pollution and water wastes. Check the coupon today for your copy.

For Prompt Service Use The Coupon

The ABC's of Soil-Cement Specification

245. Virtually all you should know about soil-cement is detailed in this handbook offered by Pettibone Wood Mfg. Co., 6900 Tujunga Ave., North Hollywood, Calif. How this material is being used as a low-cost base course in new construction, in rebuilding existing roads and shoulders and procedures for laying the material are discussed. Numerous photographs and reference charts are included. Check the coupon for your copy.

Information on the Ditch-Witch Trencher

264. Trenching costs can be cut with the Model DW Ditch Witch trencher which reattures long life, low cost and light weight and forward motion while digging is provided by a ratchet wheel attached to the rear drivin axle. tric utilities and municipalities. Write to the Ideal for plumbers, contractors, gas and elec-Charles Machine Works. Perry, Oklahoma, or use the coupon for complete details on this machine.

Engineering Data on Control Systems For Filtration Plants

270. A 12-page bulletin No. MSA 127 offered by the Hagan Corporation, Pittsburgh 30, Pennsylvania, gives complete details on control and meter components for measuring and controlling such factors as rate of flow, loss of head, filter washing, chemical feeding, settling basin and clearwell level in filtration plants. Diagrams and photographs of control and metering systems are included. Check the coupon for your copy of this valuable bulletin.

8-55

USE THIS COUPON to get detailed information on products and materials mentioned in this issue. Circle numbers below and mail today.

STOP READ AND SEND

Booklets from pages 40 to 58

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New Products, pages 166 to 169

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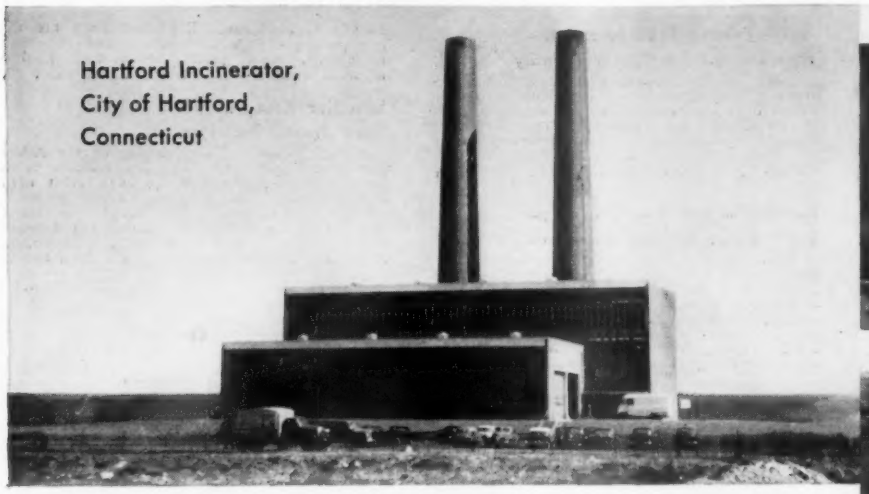
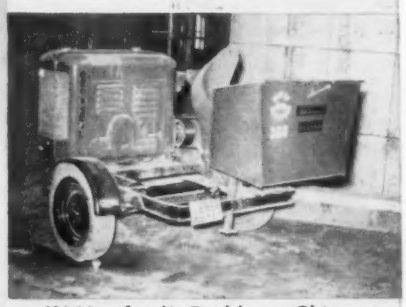


Hartford Incinerator,
City of Hartford,
Connecticut



(1) Hartford's Fitchburg Chipper

(2) Fitchburg Chipper in action

Modern Hartford disposal plant uses FITCHBURG CHIPPER

Hartford's new municipal incinerator is used to dispose of more than 400,000 pounds of waste every day. The large picture above shows this efficient, attractive plant—one of the most modern in the nation.

An important part of Hartford's up-to-date disposal program is their portable Fitchburg Chipper, which cleans up disposal jobs the incinerator cannot handle, and goes out on location for road use.

Hartford had these problems:

- *Banana Stalk Disposal*
- *Brush Disposal on New Roads*
- *Christmas Tree Disposal*
- *Road Clearance from Storm Damage*

How a Fitchburg Chipper solves these problems:

Joseph J. Coffey, Superintendent of the Hartford Incinerator, tells you in his own words how Hartford solves these problems: BANANA STALKS: "We chip 2 to 4 tons of banana stalks each week. These stalks will not burn regardless of heat in the furnaces, and we had to dump them until the Fitchburg Chipper went on duty." CHRISTMAS TREES: "During the post-Christmas season we receive many Christmas trees which we can now get rid of without the trouble of watching for burnt-down spike-like stubs which cause much trouble with the incinerator equipment."

BRUSH DISPOSAL: "Our Highway Division has used our Fitchburg Chipper to clean up the brush and branches along newly developed road areas. By chipping brush, the city saves in use of both manpower and trucking costs." ROAD CLEARANCE: "If we get hit again by hurricanes or bad wind storms, we now have an excellent piece of equipment that will enable us to readily open up the streets for emergency traffic by reducing the fallen branches to chips."

As to maintenance, Mr. Coffey says: "Our Fitchburg Chipper will pay for itself in a very short time. Maintenance, so far, is just keeping it supplied with gasoline and fully lubricated. It is easy to handle, easy to store, and very easy to use."

Get the facts!

Mail coupon for big, FREE, colorful booklet. Specifications, operating data, explanation of exclusive Fitchburg Safety Spring, actual letters from users.

FITCHBURG ENGINEERING CORPORATION

Read what leading Fitchburg users say

LINE CLEARANCE

The Shade Tree Service Company, Webster Groves, Mo.: "Our figures show that production has been increased by a good 25% with the use of the Fitchburg Chipper. One man can operate the chipper with ease. He alone can handle as much, and more, brush in the same length of time as could two men loading brush on a platform body."

POWER COMPANY

Rockland Light and Power Company, Nyack, N. Y.: "Our men have been particularly pleased with their Fitchburg Chippers. They are rugged and reliable and the convenience of flexible, yet instant brush disposal has the advantage of promoting good public relations and still gives us efficiency."

Send for FREE BOOKLET

Fitchburg Engineering Corporation
Fitchburg, Mass., Dept. [illegible]

Send my Free Chipper Booklet.

Name_____

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Thousands use our Readers' Service card to keep up to date . . . do you?

To order these helpful booklets check the coupon on page 40.

Information on Duriron
A High-Silicon Cast Iron

282. The Duriron Company, Inc., Dayton 1, Ohio has released a bulletin on duriron impressed current anodes for cathodic protection. Composition and properties of duriron, an alloy, are furnished along with the mechanical and physical properties and design. Ground bed, sea and fresh water applications are included with tests results. Check the coupon for your copy.

A Desurger For Use
Wherever Liquids Flow

321. Latest bulletin on the Westinghouse desurger has just been released by the Westinghouse Air Brake Company, Industrial Products Division, Wilmerding, Pennsylvania. Sizes and specifications and the operation of the desurger are fully described. A list of offices throughout the country is included. Check the coupon today for the bulletin.

Corrugated Steel Flooring
For New or Existing Structures

373. This 16-page manual contains charts, tables, engineering details and design data, a section on recommended installation practice, and a photographic record of actual bridge plant installations. Write to Products Information Service, Armco Drainage & Metal Products, Inc., Middletown, Ohio, or check the coupon for your copy.

Get Full Data On
Aggregate Spreaders

34. Accurate control for spreading crushed rock, chips, sand or ice control materials is featured by all models of Highway Equipment Co. materials spreaders. Data on both trailer and tailboard types available by checking the coupon. Highway Equipment Co., 630 D. Ave., Cedar Rapids, Iowa.

Uniform Salt Spreading
Saves Material

42. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on thir spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

Go-Anywhere Transportation
Provided by the "Jeep" Family

377. A new booklet which graphically portrays the wide range of uses of "Jeep" vehicles in public service is now available from Willys Motors, Inc., Toledo 1, Ohio. Specifications, special equipment, accessories and plenty of photographs of the jeep in action are included. Just check the coupon for your copy.

Reversible and Roll-Over Type
Snow Plows for any Depth of Snow

389. Village, city, county, state and airport officials send for the latest information on Frink's two catalogues on reversible trip-blade and roll-over snow plows. Complete assembly details, specifications and operation are completely outlined. Write to Frink Sno-Plows, Inc., Clayton, 1000 Islands, New York, or check the handy coupon for the catalogues.

To Restore Capacity
Of Water Lines

157. Water pipe cleaning service by hydraulic methods, power driven cleaners for scale and encrustation removal, plus relining of water mains are services offered by Ace Pipe Cleaning Contractors, Inc., 2003 Indiana Ave., Kansas City, Mo. For full description of these and other pipe cleaning services get the illustrated Ace catalog. Just check the coupon.

Pressure Pumps
For Main Testing

388. Literature on the "Porto-Pump" portable rubber gear pressure pump for pressure testing water mains, jetting operations, core and exploratory drilling and various other jobs requiring portable pressure pumps is available from Porto Pump, Inc., 227 Iron St., Detroit 7, Mich., or by checking the coupon.

Power Hydraulic
Control Equipment

396. Literature on the installation and performance of Monarch power hydraulic control equipment is available from Monarch Road Machinery Co., Hydraulic Division, Grand Rapids 4, Michigan. Explained fully are the applications of the Monarch controls on road machinery, snow plows, truck and tractor-mounted accessories. Check the coupon.

Speedier Removal of
Snow from Windrows

400. A colorful new catalog on the Athey Force-Feed HiLoader is now available from Athey Products Corporation,, 5631 West 65th Street, Chicago 38, Illinois. Catalog shows a variety of applications and details the many features of the HiLoader. Actual job data on snow removal, ditch cleaning and subgrade removal is presented. Check the coupon today.

WATER WORKS

Water Level Controls for
Sewage and Water Plants

31. Dependable float-operated pump and motorized valve controls for single or multiple pump installations are described in bulletins issued by the Water Level Controls Div., Healy-Ruff Co., 719 Hampden Ave., St. Paul 4, Minn. All units feature splash proof construction, mercury tube switches.

Elevated Tanks and
Other Storage Facilities

32. How engineers' designs and standard AWWA specifications are folllowed for fabrica-described in color illustrated booklet. Address the Darby Corp., Kansas City, Kans., or use the handy coupon.

Technical Data on Fluorides
And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

REPRINTS STILL AVAILABLE . . . BUT GOING FAST!

ALGAE OF IMPORTANCE IN WATER SUPPLY

by C. Mervin Palmer and Clarence M. Tarzwell

This major article appeared in the June issue of PUBLIC WORKS, prepared in close collaboration with U. S. Public Health service authorities. Includes for the first time in magazine history, full and accurate color plates for the identification of types of algae most important in water supplies—those which cause tastes and odors, clog filters or are likely to be found in clean or polluted waters. Color plates of this quality have never before been available to simplify the job of algae indentification. In the reprints the color plates are printed on one side of a page only, and are thus suitable for framing or mounting. The binding will permit the color plates to lie flat. Order yours immediately, at the following prices:

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photo courtesy Merritt-Chapman & Scott

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SAVE TIME, LABOR, MATERIALS WITH MOTOROLA *2-WAY RADIO*

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Get the facts. Find out how Motorola 2-way radio will pay for itself in a remarkably short time and then add clear profits for you for years to come. To get *all* the advantages radio offers, *insist* on Motorola, serviced by the Motorola man right in your area. Write today for his *experienced* help in planning your radio system.

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Get full details of this month's products . . . mail your Readers' Service card today.

Meter Features That Help Make Water Works Profitable

59. Simple design, accuracy and long life, moderate first cost and inexpensive maintenance are features of American water meters described in Bulletin No. 55 of the Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y. Be sure you have this informative booklet which gives the details of American meter design and construction plus full data on sizes, capacities and dimensions. Get your copy by checking the coupon.

Convenient Reference Manual Covers Cast Iron Pipe, Valves and Hydrants

76. An 80-page manual, issued by R. D. Wood Co. Independence Sq., Philadelphia 5, Pa., presents specifications for "Sand-Spun" cast iron pipe and fittings, outlines types of joints available, lists dimensions and weights in convenient tables and includes, in addition, full engineering data on the Mathews fire hydrant and R. D. Wood gate valves. Check the coupon for this useful information.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves are contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., Eliot Street, Fairfield Conn.

Mechanical Joint Principle Applied to Sewer Pipe

101. The Amvit joint forms a tight compression seal between bell and spigot rings, prevents infiltration and stops root intrusion. Get data on Amvit jointed vitrified clay pipe from American Vitrified Products Co., Cleveland, Ohio.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the coupon for full information including table of filter sizes and capacities, space required and filter operation.

Data Offered on Elevated Steel Tanks

166. Attractive designs for elevated steel water storage tanks are shown in bulletins of R. D. Cole Mfg. Co., Newnan, Georgia. For copies of latest Cole literature check the handy coupon.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletins for engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Locate Mains, Services and Leaks Without Digging

186. An 8-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes, cables, valves, manhole covers, conductive and non-conductive sewer pipes and septic tanks by electronic means. Dry battery operated. Only one man is needed for operation. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif., by checking the coupon.

What You Should Know About Fluoridation

217. A helpful publication entitled "Fluoridation" which describes the development of fluoridation and lists the chemicals and dosages normally used has been prepared by Wallace & Tiernan Inc., 25 Main St., Belleville 9, N. J. Copies of publications on both solution and dry feed W&T Fluoridators are also available. These publications are yours for checking the coupon

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To order these helpful booklets check the coupon on page 40.

Engineering Data on Tilting Disc Check Valves

196. The Chapman tilting disc check valve is designed to lift away from the body seat without sliding or wearing; closes without slamming. Operating principles, details of construction, dimensions, recommendations and engineering data are fully covered in 18-page Bulletin No. 30. Get your copy by checking the coupon or write to Chapman Valve Mfg. Co., Indian Orchard, Mass.

What You Should Know About The Centriline Process

197. The Centriline method for cement mortar lining water mains 16" thru 144" in place to stop leaks, prevent corrosion, increase carrying capacity and decrease pumping costs is fully described in a handsome booklet issued by the Centriline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical case histories show the operation and economies of this process. The Tate process for lining smaller mains is also covered. Check coupon for your copy.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon.

Attractive Bulletin Features Large Elevated Tanks

252. In a 24-page booklet, "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Hortonspheridal tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check coupon for your copy.

Investigate This Compact Flow Meter for Water

226. The Foster "Flow Tube" is a metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send copy, or use coupon.

Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5403 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

Equipment for Waste and Water Conditioning Processes

240. Equipment for conditioning of municipal and industrial water and treatment of industrial wastes is discussed in Bulletin WC-117, issued by Graver Water Conditioning Co., 216 West 14th St., New York 11, N. Y. For your copy check the coupon or write direct to the manufacturer.

Tablet Hypochlorinator Offers Extra Convenience

262. Economy, safety and convenience plus accurate dosage control are offered by HTH tablets and the tablet hypochlorinator. The principles of operation, applications and details on three hypochlorinator models which provide a range of dosage rates are covered in a 26-page bulletin, available from Olin Mathieson Chemical Corp., Industrial Chemicals Div., Baltimore 3, Md. Check the coupon for your copy.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in convenient booklets offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the coupon.

Engineering Data on Lubricated Plug Valves

355. Full information on Homestead lubricated plug valves in full-port and venturi types, sizes up to 14", and with a choice of self-sealed two-piece plug or one-piece plug designs. Engineering information includes principal dimensions, types of control, metals, lubricants, etc. For your copy write Homestead Valve Mfg. Co., Coraopolis, Pa., or check the coupon.

How Your Filter Washing Can Be Improved

368. More effective sand washing with elimination of mud balls and bed cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by Palmer Filter Equipment Co., Erie, Pa. Get latest data by checking the coupon.

How A Diatomite Filter Works

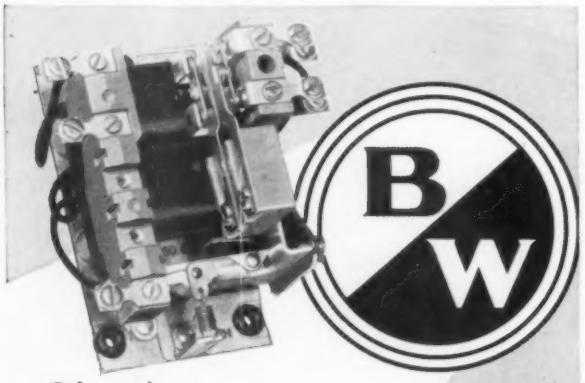
384. The three main steps in diatomite filter operation—precoating, filtering and cleaning are discussed and clearly illustrated with specially prepared drawings in Bulletin No. 5502 of the General Filter Co., Box 11, Ames, Iowa. Get this interesting bulletin by checking the coupon.

Data on Diatomaceous Earth Filters for Swimming Pools

390. Engineering data on Purecel Filters for clarifying swimming pool water is offered in Sup. Bulletin 1800-3 by Proportioneers, Inc., 345 Harris Ave., Providence 1, R. I. Advantages, operating details, piping installation drawing and size selection table are included. Get your copy by checking the coupon.

Helpful Engineering Data on Cast Iron Pipe

422. Complete data on McWane Super-DeLavaud centrifugally cast pipe with bell and spigot or mechanical joints is contained in Bulletin WP-54, issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala. Size range includes 2" through 12" diameters, 18 feet long. Check the coupon for your copy.



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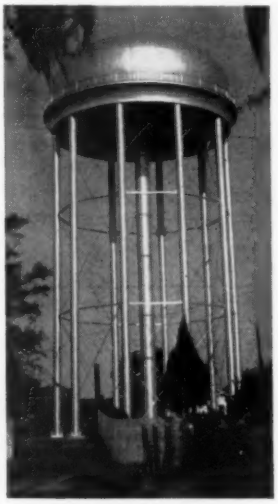

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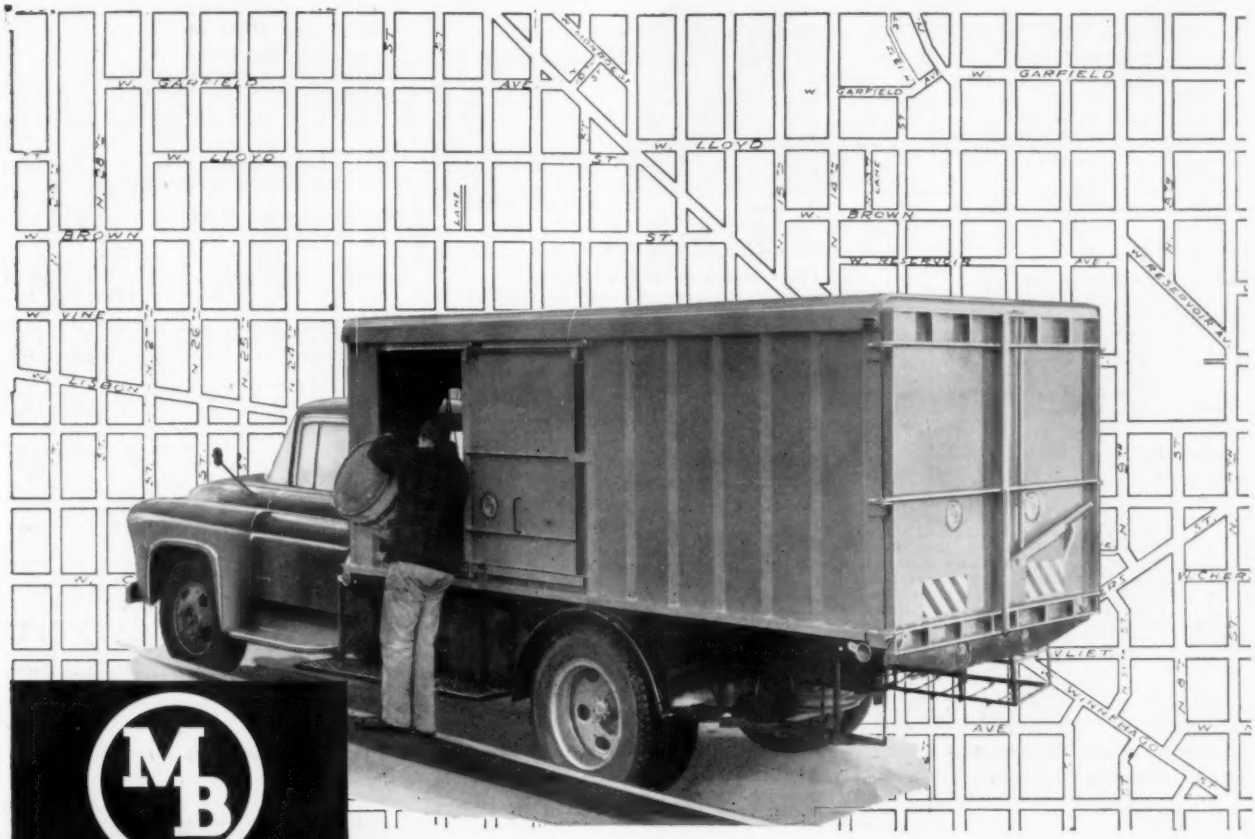

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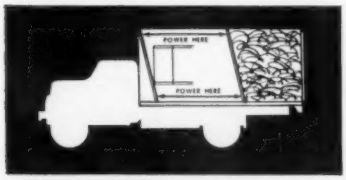

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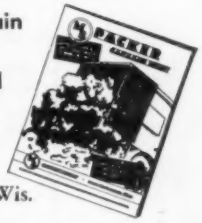

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Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. Check coupon for your copy.

Points to Consider in Filter Sand Selection

332. Best operation of rapid sand filters requires filter media which is hard, properly shaped, carefully graded and perfectly clean. Filter sand and gravel which meets these exacting requirements is available on short notice from Northern Gravel Company, Box 307, Muscatine, Iowa. Get full details by checking the coupon.

Modern Filtration of Swimming Pool Water

351. Latest data on filtration systems for swimming pools of 50,000 gallon capacity and over is presented in 24-page bulletin No. 625 by R. P. Adams Co., Inc., 225 East Park Drive, Buffalo 17, N. Y. Design and operating data are provided, together with material to assist you in choosing the right filter for your pool. Check the coupon for your copy of this helpful bulletin.

●

SEWERAGE AND WASTE TREATMENT

Packaged Sewage Treatment— Just Right for Small Places

36. "Pakage" Sewage Treatment Plants specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., Dept. J, 622 Diversey Pkwy., Chicago 14, Ill.

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 48-page booklet issued by Flexible, Inc., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeR, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

Chemical Resistant Coating For Concrete Pipe

55. Rexon Coating No. 2, developed specifically to protect concrete pipe against the chemical attack of sewage and industrial wastes, is described in Bulletin R-2 of Hamilton Kent Mfg. Co., 427 West Grant St., Kent, Ohio. Properties of this coating make it virtually inert to all acids, alkalies, oils and solvents. For full details on characteristics, working properties and methods of application check the handy coupon.

Engineering Data on Screening Equipment

77. Water, Sewage and industrial waste screening equipment is fully described in a 28-page book, No. 2587, offered by Link-Belt Co., Dept. 137, Colmar, Pa. Complete data for the engineer and tables to determine the proper size unit for handling various capacities are included. This valuable, comprehensive booklet may be obtained by checking the coupon.

Helpful Design Data For Sewage Ejectors

81. The application and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

Stop Sewage Plant Odor Complaints

137. Effective odor control for sewage treatment plants by use of "Orthosolv" is described in literature of Solvay Process Div., Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y. Low cost, convenience and safety are important features. Get full data by checking the coupon.

Standardized Process Control Instruments

203. Meters, regulators, indicators and pneumatic recorders and controllers are described in a 24-page catalog available from the Fischer & Porter Company, Hatboro, Penna. Complete specifications including dimensions, prices, capacities and construction materials are included. Check the coupon for your copy.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

How to raise
sunken curbs
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sidewalks
street slabs

KOEHRING MUD-JACK® pumps soil-cement slurry under pressure into small holes drilled through pavement. This displaces air pockets, water, or water-saturated materials — raises the concrete slab — leaves solid, permanent sub-grade. How else could you do it? *Only with a Koehring Mud-Jack.* Two sizes: compact, portable No. 10 for city work (illustrated) — and big No. 50 for preventive maintenance and low-cost repairs on highways.

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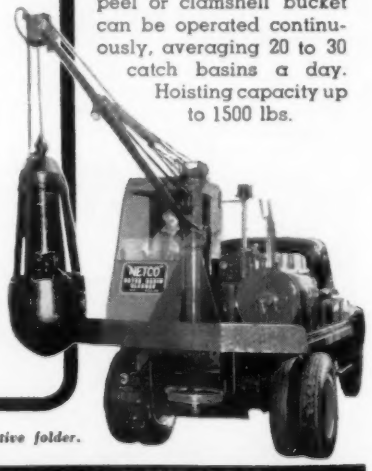

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LOW LOADING SILL for more comfortable loading. It's wide enough to accommodate two men with plenty of elbow room.

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- TONS OF PRESSURE exerted against refuse by mold board type packing plate pack the maximum amount of material into the big body. Fewer trips to the dump save money!
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Get full details of this month's products . . . mail your Readers' Service card today.

To order these helpful booklets check the coupon on page 40.

Blower Selection Data Aids Sewage Plant Design

274. Characteristic curves for blower operation with constant-speed, multi-speed and variable speed motors; details of several types of blowers; data on accessories; and a discussion of advantages of positive displacement rotary blowers are provided in Bulletin RB 154 of Roots-Connersville Blower Div., Connersville, Ind. Get this helpful bulletin by checking the coupon.

Helpful Data on Bermico Pipe Fittings

280. Data are now available on fittings for use with Bermico sewer pipe and perforated pipe—T's, Y's and bonds—in sizes and combinations not previously available. These make complete root-proof, water tight, corrosion-resistant Bermico pipe systems. Get full information by checking the coupon. Brown Co., 150 Causeway St., Boston, Mass.

Get the Facts on The Contact Aeration Process

303. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas. Check the coupon to get the facts.

Flexible Coupling Speeds Vitrified Pipe Installation

311. Fast pipe laying with chemically inert, leakproof joints is made easy by Universal vitrified pipe with Tylox rubber joints. Full information on these materials and pipe laying methods is available from Universal Sewer Pipe Corp., 1500 Union Commerce Bldg., Cleveland 14, Ohio.

Engineering Data on the "Cavitator" Waste Treatment System

323. Detailed information on the Cavitator system for secondary treatment of municipal waste is offered by Yeomans Brothers Co., 1999 N. Ruby St., Melrose Park, Ill. Be sure to investigate this system which offers high oxygen transfer efficiency, high performance on relatively low flows and low installation and operating costs. Check the coupon for full data.

"Float-Treat" Process For Industrial Wastes

333. The Rex "Float-Treat" process, a system used to separate greases, chemical flocs and suspended organic matter from industrial waste liquids, is the subject of a new booklet issued by Chain Belt Co., Milwaukee 1, Wis. Detailed description includes plan views, diagrams, photos and text. Get Bulletin 54-82 by checking the coupon.

Engineering Data on Gas Safety Equipment

343. P.F.T. Gas Safety Equipment for Controlled Digestion is the subject of an excellent 12-page bulletin issued by Pacific Flush Tank Co., Chicago 13, Ill. Full engineering data on flame traps, pressure releases, waste gas burners and related equipment is provided in convenient form. Requests for this valuable booklet must be made on business letterhead.

For Prompt Service Use The Coupon

Have You Heard About Bionetics For Sewage Treatment?

350. Bionetics, a dry staple powder of groups of living organisms preserved with enzyme systems, is available in several types to improve and accelerate the biological processes performed at sewage treatment plants. Get full data from Reliance Chemicals Corp., Box 6724, Houston 5, Texas. Just check the handy coupon.

Getting Improved Sludge Dewatering With Non-Clogging Vacuum Filters

425. Latest information on the Komline-Sanderson "Coilfilter", which features non-clogging, permanent filter media to obtain constant output and low operating cost is presented in illustrated Bulletin No. 102 by the Komline-Sanderson Engineering Corp., Peapack, N. J. Be sure to investigate this improved method of sludge dewatering. Check the coupon today.

Shredders and Grinders For Efficient Sewage Treatment

346. Latest data on screenings shredder, garbage grinder and dry sludge shredder are presented in Bulletin SG10 by Gruendler Crusher & Pulverizer Co., 2915 North Market St., St. Louis 6, Mo. Dimension and capacity charts are provided, together with drawings and photographs of the grinders and screens. Check the coupon.

STREETS AND HIGHWAYS

How to Select Prestressed Concrete Bridge Members

26. Colorful folder, well illustrated, shows manufacture of "Amdek" prestressed bridge members and provides selection tables covering several AASHO loadings. Full data from Concrete Products Div., American Marietta Co., 104 East Ontario St., Chicago 11, Ill. Check the coupon for your copy of this helpful reference bulletin.

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wis. Check the coupon.

Tractor-Backhoe Combination Offers Big Returns

30. Features of the Allis-Chalmers Model WD-45 wheel tractor equipped with Henry backhoe and other Henry hydraulically operated attachments are outlined in an attractive 8-page catalog now available from the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis. In addition to specifications, the catalog includes illustrations of the basic unit and of various Henry front and rear mounted attachments plus details of the tractor itself. Get Catalog MS-982 by checking the coupon.

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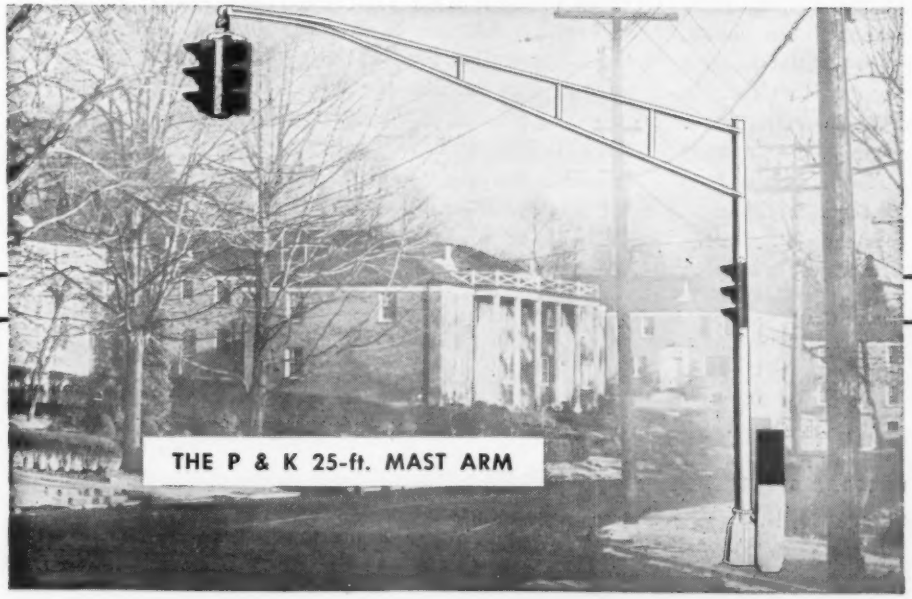

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Bitumuls Paving Handbook Full of Useful Data

23. The latest edition of the Bitumuls Paving Handbook covers a wealth of practical data on paving methods and materials, road and airport paving specifications and construction details, complete tabular data on asphaltic binder applications and aggregate requirements, condensed Asphalt Institute specifications plus data on Laykold compounded asphalts for flooring, tennis courts, protective coatings and waterproofing. You can have a copy by checking the coupon. American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 4, Calif.

Better Highways Through Salt-Soil Stabilization

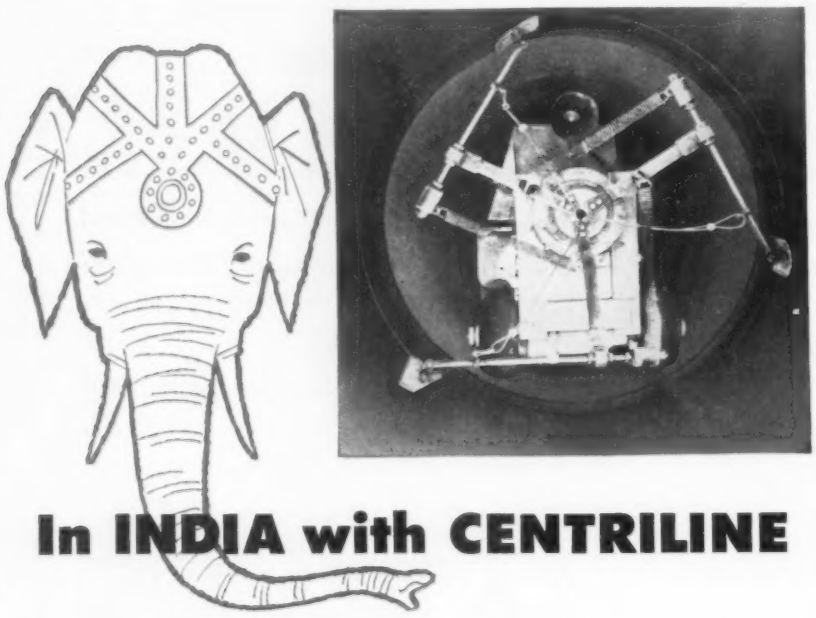
123. Shoulder stabilization is the subject of a new booklet in the series of informative pamphlets issued by International Salt Co., Inc., Scranton, Pa. Step-by-step illustrations show construction procedures in detail. For practical information on this important subject check the coupon today.

Useful Attachments for "Payloader" Tractor Shovels

95. Increased versatility for Hough "Payloader" tractor shovels is made possible by the various attachments described in literature of the Frank G. Hough Co., 761 Seventh St., Libertyville, Ill. Illustrated and described are rotary "V" and trip-blade snow plows, hydraulic backhoe, back-filler blade, pickup sweeper, scarifier teeth, winches, etc. Check the coupon today and full details will be sent.

Better Paving On Small Jobs

176. Blaw-Knox Company's small-job paving machine, the Adnun Jr. 8, is the subject of a new bulletin, No. 2609. The Adnun Jr. is equipped with a 12-HP motor. Hopper capacity is approximately 2 tons. It will pave an 8-ft. strip. For full engineering details and on-the-job performance data, get this bulletin from Construction Equipment Div., Blaw-Knox Co., Pittsburgh 38, Pa. Check the coupon.



In INDIA with CENTRILINE

On the coast of India, the Burma-Shell Refining Company has used the Centriline process on over 21,000 feet of sea-water cooling pipe. Through Centrilining, a cement-mortar lining is centrifugally sprayed on the pipe walls. Corrosion and tuberculation are eliminated . . . pumping costs are lowered . . . flow is increased . . . maintenance becomes negligible . . . and pipe life is extended indefinitely. This particular project in Bombay called for the Centrilining of 32" I.D. and 36" I.D. new steel pipe with 5/16" lining. But Centrilining works wonders in old pipes as well—with a minimum of surface traffic interruption. Proof of the pudding is in our files—the ever increasing number of repeat contracts from municipalities, industries and contractors. Why not follow their lead. Look to Centriline to rejuvenate *your* water supply systems.

Lummus Company, India, was engineer and constructor on this project. Asiatic Petroleum Corp. was buyer for the owner.

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Be Sure to Investigate These Parking Meter Features

146. Parking meters designed for greater public convenience, unlimited flexibility with easy adjustment of time limit rate and coin acceptance plus simplified enforcement inspection are described in the attractive bulletin of Magee-Hale Park-O-Meter Co., Commerce Exchange Bldg., Oklahoma City 2, Okla. Get all details on the Model H meter by checking the coupon.

Trenching Equipment Data Conveniently Assembled

212. The entire line of Cleveland trenching and backfilling equipment is now covered in a single bulletin, with material arranged for quick comparison of capacities, specifications and dimensions of all models. Twenty-four action photos graphically illustrates various job applications. Get Bulletin S-120 now for easy review of your trenching equipment needs. Just check the coupon or write to the Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.

What You Should Know About Soil Sampling

255. Acker Soil Sampling Catalog No. 25 contains a complete and thorough collection of information about soil sampling in all types of sub-surface conditions. Modern sampling techniques are discussed together with recommendations as to tools and accessories. Write Acker Drill Co., Inc., Scranton, Pa., or check the coupon.

Give Full Protection To Treated Poles and Timbers

267. Bolt holes in treated poles and timbers used for guard rails and structures can easily be the first point of decay. Now you can assure maximum life by using the Greenlee Bolt Hole Treater, a simple device that forces preservative into the wood cells. Bulletin 13-15 gives the details. Greenlee Bros. & Co., Rockford, Ill.

How to Solve the Brush Disposal Problem

277. Fitchburg Chippers, engineered to solve the brush disposal problem, reduce troublesome brush and trimmings to tiny, easy-to-dispose-of chips. Several models are available to meet your needs. May be mounted on truck body or on trailer, tractor or jeep. Full details in interesting, profusely illustrated 16-page bulletin. Write Fitchburg Engineering Corp., Fitchburg, Mass., or check the coupon for your copy.

Heater-Planer Gives Low-Cost Surface Repairs

287. Low-cost resurfacing and repair work on bituminous pavements is made easy with the Littleford-Clarkmoore Heater-Planer. Machine operates continuously, heating and planing as it travels. Precise control leaves smooth riding surface. Get the details by writing to Littleford Bros., Inc., Cincinnati 2, Ohio, or check the coupon.

The Bros Line of Road Machinery

289. An illustrated folder describing the Bros line of road machinery is available from Wm. Bros Boiler & Manufacturing Co., Minneapolis 14, Minn. Full descriptions of Bituminizer distributors, Spraymatic spray bars, several types of compacting equipment and other units are included. Check the coupon.

Windrow Loader is Tailor Made for Majority of Highway Needs

296. The peculiar problems of windrow loading require in most cases a medium capacity, low cost, highly maneuverable machine. To meet these needs Barber-Greene Co. now has a 4 cu. yd. per min. Windrow Loader, mounted on a John Deere wheel tractor. Further details may be obtained from Barber-Greene Co., Aurora, Ill. by checking the coupon.

How the Mobil-Sweeper Can Improve Street Sweeping

305. Sweeping costs can be cut with the Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to the Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

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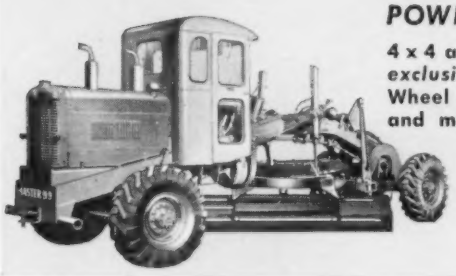
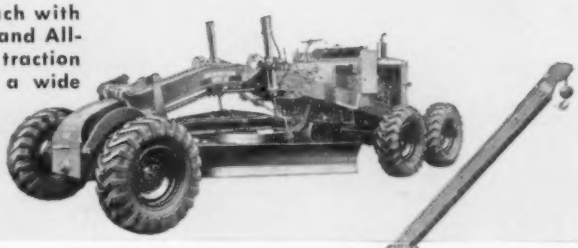
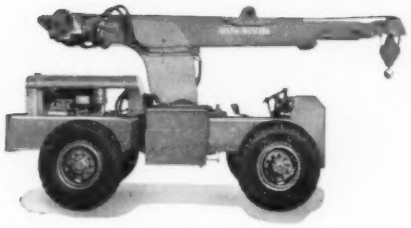


POWER GRADERS

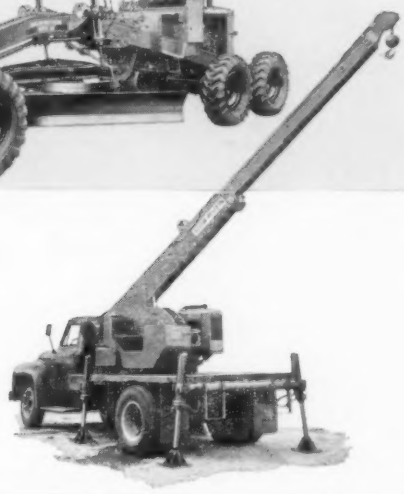
4 x 4 and 6 x 6 models, each with *exclusive* All-Wheel Drive and All-Wheel Steer for maximum traction and maneuverability, plus a wide assortment of time-saving, money-making attachments.

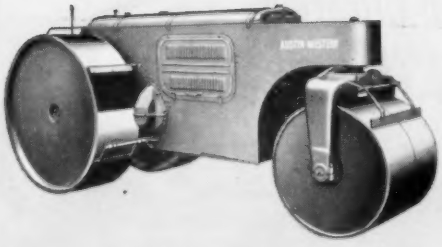




HYDRAULIC CRANES

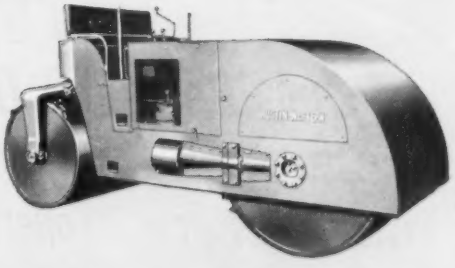
Self-propelled and truck-mounted models. The telescopic boom raises and lowers, rotates 360° and handles a wide variety of jobs with superb precision.

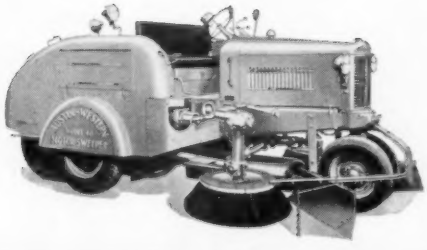




ROAD ROLLERS

3-wheeled and tandem models . . . variable weight . . . gas or diesel engines. Torque Converter Drive is smooth powerful and flexible.





MODEL "40" SWEEPER

Single or double gutter broom . . . front steer for safety and maneuverability . . . rear dump for convenience . . . broom sweeps directly into hopper for efficiency and economy.

Your nearby distributor will gladly furnish special catalogs on any or all Austin-Western products.

Austin-Western

Power Graders · Motor Sweepers
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BALDWIN BLH LIMA-HAMILTON

Construction Equipment Division

Manufactured by
AUSTIN-WESTERN COMPANY
Subsidiary of Baldwin-Lima-Hamilton Corporation
AURORA, ILLINOIS, U.S.A.

Now's the time to mail this month's Readers' Service card.

8 Reasons Why You Should Check the Jaeger Loader

207. In a profusely illustrated 16-page catalog devoted to the applications and special design features of the Jaeger "Load-Plus" tractor-loader unit, eight good reasons listed to back up the claim that this machine outproduces any other loader of its size. These include load capacity, balance, reach, maneuverability, automatic power adjustment by torque converter, instant reversal, multiple speed and ease of control. Check them all by getting a copy of Catalog L100-3. Check the coupon today. Jaeger Machine Co., 400 Dublin Ave., Columbus 15, Ohio.

How Motor Graders Beat the Snow Problem

307. The power and directional control of Austin-Western Four-Wheel Drive, Four-Wheel Steer Power Graders are a combination that beats the toughest plowing combination. Get data on plow and snow loader attachments for graders from Austin-Western Co., Aurora, Ill. Check the coupon.

Better Drainage for Streets and Highways

358. Irving "Dryway" Draingrates provide maximum drainage openings for catch basin inlets, across-the-road drains and centerline drains. Light weight, strength, economy and corrosion resistance are a few of the many features offered. Full descriptive details on both riveted and pressure locked type are furnished in an illustrated bulletin by Irving Subway Grating Co., Inc., 50-53 27th St., Long Island City 1, N. Y. Check the coupon.

Two-Way Radio Equipment For All Departments

363. The benefits of two-way radio communication in the uncongested non-interference 450-megacycle range make full information on this subject important to all engineers. Get full data on trouble-free systems from Motorola, Inc., Dept. PW, 4545 Augusta Blvd., Chicago 51, Ill. Just check the coupon.

A Highly Active and Potentially Useful Algicide

354. Tests of Dichlone, the active ingredient of Phygon-XL, shows it to be a most effective chemical for killing blue-green algae in lakes and ponds. A report on the results of these tests and usage and availability of this algicide can be furnished by Naugatuck Chemical Div., Bethany 15, Conn., or by checking the coupon.

Advanced Tractor Design Gives Better Performance

399. For greater power, performance and economy, Ford Tractor offers 4-wheel stability, built-in hydraulic system and power take-off among the many new features. A complete booklet describes five models in two power series, showing the latest in advanced tractor design. For your copy check the coupon or write Tractor and Implement Division, Ford Motor Co., Birmingham, Mich.

Effective Sweeping for Cleaner Streets

421. Outstanding features of Wayne Model 450 Sweepers are described in an attractive folder which covers operating advantages and general specifications. Data on dual control models are included. For your copy write Wayne Mfg. Co., Pomona, Calif., or check the coupon.

CONSTRUCTION EQUIPMENT AND MATERIALS

For Fast, Smooth Pipe Cuts

68. Descriptive literature on the Reed 4-wheel hinged pipe cutter which operates in close quarters, gives quick, easy right-angle cuts, is available from Reed Mfg. Co., Erie, Pa. Check the coupon.

1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

For Prompt Service Use The Coupon

Helpful Booklet on Carryable Centrifugal Pumps

129. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Port Chester, N. Y.

Heavy-Duty Pipe Cutter Works In or Out of Trench

164. Built to stand the most severe service, the all-purpose Ellis & Ford pipe cutter, for cast iron water mains 4" through 12", is easy to use in tight places, works in or out of trench. Full details on cutter and interchangeable parts in Catalog 37, available by checking coupon. Ellis & Ford Mfg. Co., Ferndale 20, Mich.

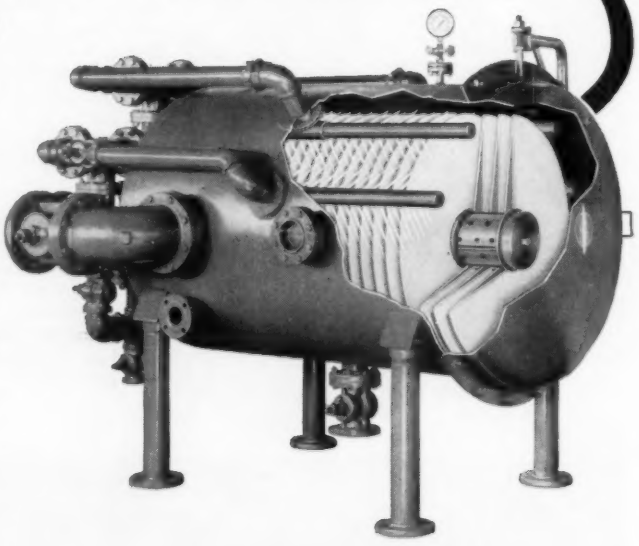
Get Data Now on This Catch Basin Cleaner

198. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clarke-Wilcox Co., 118 Western Ave., Boston 34, Mass.

A new trend in municipal water filtration —

The SPARKLER DIATOMITE FILTER MODEL SCJ

has been highly successful in installations now in operation



Reduced operating cost due to long filtering cycles and fast backwash cleaning, together with a remarkably low bacteria count requiring a minimum of chlorination, are features that make this new type filter worthy of the attention of all waterworks engineers.

With every backwash cleaning, the used filter cake is washed out with the residue, and a fresh pre-coat of diatomite applied to the filter plates, providing a completely new sanitary filtering media with each cleaning.

This filter removes all silica, sand, algae, organic matter, silt, etc., from the raw water, and bacteria is reduced up to 80% and even more in some cases. The high quality of water obtained will raise the standard of water produced by some municipal water systems now using old methods of filtration.

Practically any volume of city water can be filtered economically in the Sparkler SCJ filter. Single units capable of handling 5,000,000 gallons of water a day are available. Multiple units can be engineered into a system for larger requirements.

Less than 0.2% of water is required to backwash and clean the largest filter units and a complete fresh precoat of diatomite can be applied and the filter ready to resume operation in 15 minutes.

Operators can be easily trained, no highly skilled specialized personnel is required to insure efficient performance.

Write for plans and prices on your requirements. Address Dan Baldwin for personal service.

SPARKLER MANUFACTURING CO.

Home office and plant, Mundelein, Ill.

SPARKLER INTERNATIONAL, LTD.

Plants at Galt, Ontario, Canada — Amsterdam, Holland

Manufacturers of industrial filters for over a quarter of a century.

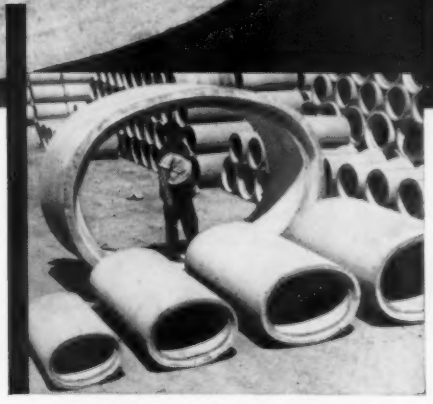
Get full details of this month's products . . . mail your Readers' Service card today.

LO-HED Reinforced Concrete Pipe for Culverts and Sewers

Greater Capacity . . . Faster, Easier Installation . . . Less Cost!

Elliptical LO-HED Pipe carries a greater flow than its round equivalent—in a minimum depth of cut with increased depth of cover. LO-HED Pipe is easier to lay, to grade and line. Smooth walls and tight joints insure maximum hydraulic capacity, with a minimum build-up of debris in the invert, even under low-flow conditions. Furnished in pre-tested strengths to answer any low headroom problem, including culverts under highways and railroads.

Write today for specifications on time and money-saving LO-HED Reinforced Concrete Pipe.



A full range of sizes in LO-HED Pipe is available for nearly all culvert and drainage installations. Shown above are the LO-HED equivalents of round pipe sizes 18″ – 24″ – 30″ – 36″ – 90″ – 120″.

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CONCRETE PRODUCTS DIVISION

GENERAL OFFICES
AMERICAN-MARIETTA BUILDING, 101 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS PHONE: WHITEHALL 4-5600

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Universal Concrete Pipe Co.

Need more facts about advertised products? Mail your Readers' Service card now.

To order these helpful booklets check the coupon on page 40.

What's Your Digging Problem? Repair Work? Trenches? Footings?

35. At today's prices, hand digging means the job will be costly. You can dig through asphalt and macadam, work fast and efficiently even in cramped areas with the tractor mounted Sherman Power Digger. From one position you can reach to dig 14 feet behind tractor in 140° arc and dig to a depth of 10 feet. For full details check the coupon. Sherman Products, Inc., Royal Oak, Mich.

Streamlined Data on Tractors, Scrapers and Power Units

102. The complete line of International Industrial Power products, 73 in all, is described in a new 48-page catalog just published by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Technical data has been streamlined, yet provides abundant descriptive material on each piece of equipment. Check the coupon for the latest on crawler and wheel tractors, scrapers, dozers and related attachments plus International Diesel, gasoline and gas power units.

Latest Information on Tandem Rollers

104. The tandem roller line of Huber-Warco Co., including 5-8, 8-10, 8-12 and 10-14 ton models, is covered in 16-page Bulletin HWT-501. Cross-sections, diagrams and photos point out principal engineering features which mean top performance and ease of operation. For a copy of this bulletin write Huber-Warco Co., Marion, Ohio, or check the coupon.

How Air Placement of Concrete Will Help on Your Jobs

215. There are hundreds of jobs that can be done easier and cheaper by air placement of concrete; reservoir, tank and pool linings, concrete maintenance of all sorts are just a few of the applications. Get full details on two models of the high speed, easily operated "Bondactor" from Air Placement Equipment Co., 1009 West 24th St., Kansas City 8, Mo. Check the coupon.

Handbook of Castings For All Public Works Construction

220. Every type of construction casting needed by engineers and contractors in the public works field will be found in a 136-page catalog issued by Neenah Foundry Co., Neenah Wis. Detailed illustrations and complete tables of dimensions will help the designer and materials buyer. Get your copy of this valuable catalog by checking the coupon today.

Roadside Cleaning Problems Simplified with the "Scavanger"

320. Be sure to investigate the Good Roads motorized "Scavanger" for the solution to your roadside clearing problems. Powerful exhaust fan draws all types of debris into the air-tight body through a 12" dia. hose. Picks up bottles, cans, cartons, leaves, twigs, all kinds of debris—wet or dry. The 12 cu. ft. body is readily emptied with its own self dumping mechanism. Efficient, dependable filters hold back all solids to protect the blower rotor. Get full information by writing to Good Roads Machinery Corp., Minerva, Ohio, or check the coupon.

Faster Cuts in Concrete Pavement

317. Clean, fast cuts in green or cured concrete and asphalt pavements are easily made with the powerful Champion concrete saw. Perfect balance and "either-side" blade arrangement helps speed the work when sawing joints and cutting outlines for patches. Get full details from Champion Mfg. Co., 2028 Washington Ave., St. Louis 3, Mo. Just check the coupon.

Portable Melting Furnace For Rubberized Joint Sealers

357. The Hauck double jacketed melting furnace uses L-P gas as fuel and a high flash point oil for heat transfer to assure close temperature control when melting rubberized joint sealers of all types. All details on this 16-gallon capacity unit are furnished in Bulletin 1081. Check coupon for your copy. Hauck Mfg. Co., 124 10th St., Brooklyn 15, N. Y.

Automatic Cutter Saws Cast Iron Pipe

393. This portable automatic pipe saw, available with either pneumatic or electric drive, makes fast precision cuts in 8-in. to 60-in. cast iron or steel pipe. Features are light weight, minimum clearance required, easy operation even when submerged. Get details from Prescott Tool Co., Inc., Worcester, Mass., by checking the coupon.

Economical Scraper Handles Many Heavy Jobs

398. Among the many applications of the versatile Model D Tournapull are: grading and building roads; handling garbage disposal; and grading, leveling and terracing. For details on how its speed, power and ability to work either as a self-loading tool can help your production and lower your costs, write Le Tourneau-Westinghouse Co., Peoria, Ill., or check the coupon.

How to Choose the Right Self-Priming Centrifugal Pump

427. Descriptive folders on the complete line of contractors' pumps have been issued by the Gorman-Rupp Co., Mansfield, Ohio. 2-in. to 10-in. models are illustrated, performance tables are shown and pump selection tables are included to assist in choosing the proper pump for different jobs. Check coupon for your copies.

CIVIL DEFENSE

Diesel Engines For Municipal Power Needs

359. Dependable power for water supply or flood control pumping stations, stationary or portable electric plants and many other municipal needs can be provided by engines described in literature of the Enterprise Engine & Machinery Co., 18th & Florida Sts., San Francisco 10, Calif. Get latest data by checking the coupon.

FILTER SAND AND GRAVEL

Produced from an inland pit hence free from river contamination and foreign matter.

Shipment in bulk or bagged.

Many of the larger filter plants throughout the United States are equipped with our products.

PROMPT SHIPMENT

Inquiries and orders solicited.

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Muscatine, Iowa
P.O. Box 307 Amherst 3-2711

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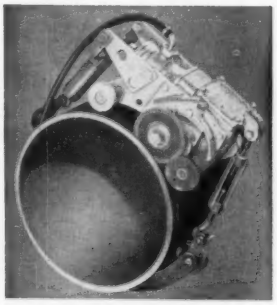
PORTABLE AUTOMATIC PIPE CUTTERS
with Pneumatic or Electric Drive

for Cast Iron and Steel Pipe from 6" to 60" diameter



- Weight: only 145 lbs.
- Clearance: 12" max. around pipe.
- Set up time: 5-10 min. by 1 or 2 unskilled men.
- Machines operate under water.
- Cuts 8" pipe in 5 min.—24" in 18 min.
- Also available: "V" cutter for welded steel pipe.

AMAZINGLY LOW COST

SIX MONTHS GUARANTEE

Write DRAWER A

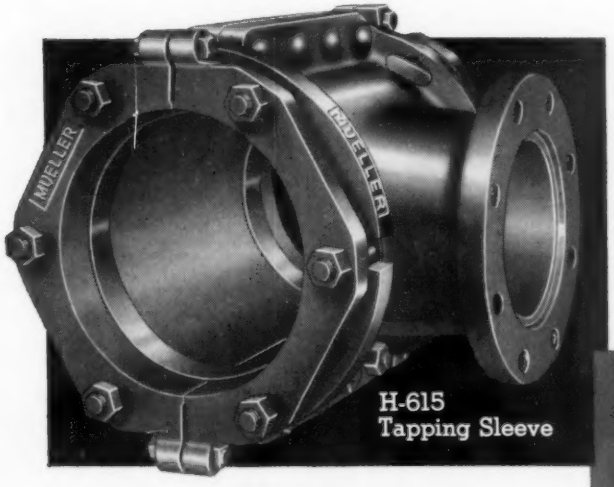
PRESCOTT TOOL CO., INC.
BOX 7 — GREENDALE BRANCH — WORCESTER 6, MASS.
TELEPHONE TEmple 5-4431

MUELLER®

Connect Branch Mains...

quickly
safely
simply

under pressure!



H-615
Tapping Sleeve

H-667
Tapping Valve

Mueller Tapping Sleeves and Valves are the most practical—and economical—means of connecting lateral or branch mains. Connections are made and lateral is put in service under pressure with a Mueller "CC" or "C-1" Drilling Machine —no shutdown, no loss of water, no interruption of flow in main!

Heavy duty construction and extra length of mechanical joint tapping sleeve assures maximum rigidity and strength. One mechanical joint sleeve of a nominal size will fit all classes of cast iron pipe regularly used by using only two sets of gaskets. Main sizes from 4″ through 12″ with various combinations of outlet sizes 2″ through 12″ are available.

Special mechanical joint tapping valve has oversize waterway—allows full-size cut for maximum flow. Exclusive four-point disc wedging mechanism assures tight shutoff and trouble-free operation. Available with "O" rings or conventional packing in sizes 2″ through 12″.

Tapping Crosses, Split Repair Sleeves and Cut In Sleeves and Valves are also available with mechanical joints.

Calked type tapping sleeves are available which will fit all classes of pipe for mains 3″ through 36″ with various combinations of outlets 2″ through 16″. Calked type tapping valves are available with "O" ring or conventional packing or flanged type for post indicator, with conventional packing only—sizes 2″ through 16″.

Consult your Mueller Representative, Catalog W-96 or write direct for full details.

MUELLER CO.

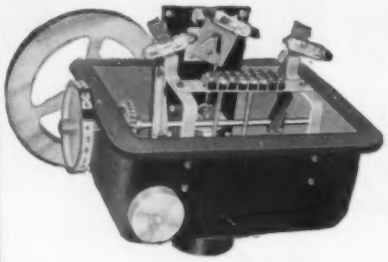
Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

To order these helpful booklets check the coupon on page 40.

ROTO-TROL



RF-2
with ALTO-TROL

Puts that second pump to work.

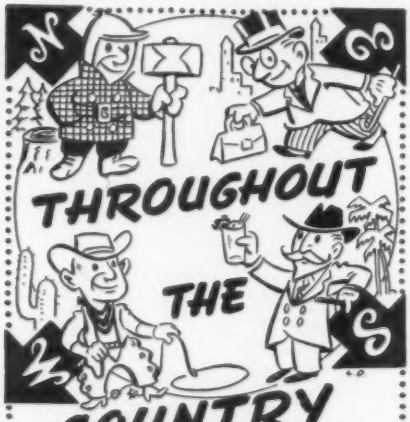
A 2-pump RF-2 ROTO-TROL with a built-in ALTO-TROL will operate each pump on alternate starting cycles, assuring equal use and wear of both pumps. Operates both pumps when required. FLOAT-CONTROLLED. Depth Indication optional — extra.

Write for full data.

Water Level Controls Division

HEALY-RUFF Company

791 Hampden Ave., St. Paul 4, Minn.



THE NATIONALLY RENOWNED

ACE-METHOD CLEANS SEWER AND WATER MAINS FASTER, CLEANER, MORE ECONOMICALLY

FREE ESTIMATES AND CATALOG
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Sewer and Water Main Cleaning Specialists serving MUNICIPALITIES, INDUSTRIES, UTILITIES.

Ace PIPE CLEANING, INC.

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Do You Have An Independent Source of Electricity?

27. An independent source of electricity which will supply power for vital services when regular sources fail can be invaluable during emergencies. Check Kohler Bulletin KEP-31 which furnishes data that will help you select the plant best suited for your needs. Many models, 500 watt to 30 Kw, portable and stationary, are described. Write the Kohler Co., Kohler, Wis., or use the coupon.

Does Your Water Works Have Standby Power?

224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load operation. Use the coupon for full data on Climax, 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., So. La Salle St., Chicago 3, Ill.

●

STREET LIGHTING AND TRAFFIC CONTROL

Investigate These Street Lighting Standards

54. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards, brackets and mast arms by using the handy coupon. Check these strong, well designed, inexpensive steel standards for practical street and highway lighting. Handsome 26-page folder includes data sheets on floodlighting and area lighting applications. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

How Electro-Matic Controllers Solve Problem of Congested Intersections

60. Traffic control system regulated by Electro-Matic Controllers continually adjusts to changing traffic patterns to clear traffic faster and relieve the problem of congested intersections. Be sure to investiate this method of expediting traffic flow at difficult intersections. Get full data from Automatic Signal Div., Eastern Industries, Inc., East Norwalk, Conn. Just check the handy coupon.

For Prompt Service Use The Coupon

Convenient Data on Traffic Signs and Markers

126. A complete line of traffic control devices, including stop signs, warning signs, regulatory signs and danger signals is presented in the fully-illustrated catalog of the Grote Mfg. Co., Bellevue Ky. Helpful excerpts from the "Manual on Uniform Traffic Control Devices for Streets and Highways" are included. Get a copy by checking the coupon.

Street Lighting Application Curve Eliminates Calculations

257. An easy-to-use chart from which illumination level, spacing and proper mounting height can be determined has been prepared by the Illuminating Engineering Laboratory, General Electric Co., West Lynn 3, Mass. For a copy of the chart and instructions on its use check the handy coupon.

Latest Data on Standards For Traffic Control Signals

258. All-aluminum standards and brackets for mounting traffic signals over roadways and pedestal-type bases for signals mounted on the curb are described in a bulletin of Pfaff & Kendall, 84 Foundry St., Newark 5, N. J. Check the advantages of these maintenance-free units when planning new installations and replacements. Use the coupon to get latest data.

Valuable Booklet on Series Streetlighting Systems

306. This booklet discusses the operating characteristics of mercury lamps on series street lighting systems and analyzer requirements for auxiliary equipment. Wiring diagrams and photographs to illustrate the principal equipment required for series operation are furnished. Booklet B-6513 is available from Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio, or by checking the coupon.

●

REFUSE COLLECTION AND DISPOSAL

How New, Larger Load-Packer Cuts Refuse Collection Costs

51. Ever increasing problems in refuse collection work include longer hauls and higher costs of labor, chassis, operation and maintenance. As a solution, Gar Wood offers Load-Packers with dual-thrust compaction that gives big capacity on shorter wheelbase, plus safe, labor-saving operation. Profusely illustrated Form W-144 tells why you should investigate Load-Packers. Check coupon or write Gar Wood Industries, Inc., Wayne, Mich.

Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

New M-B Packer Body Designed for Maximum Payload

389. The M-B Packer Body, designed to provide maximum payload on a minimum size, low-cost truck, features effective, simple compaction system; provides easy loading, positive discharge, all safety features. Available in 12-14-16 yd. capacities. Get all the facts from M-B Corporation, New Holstein, Wis. by checking the coupon.

How to Construct A Sanitary Fill

331. A new 12-page booklet which tells the most efficient method of sanitary fill construction and furnishes complete information on planning and operation is now available from Drott Mfg. Corp., Milwaukee 8, Wis. Get your copy by checking the coupon; you'll find this booklet both interesting and valuable.

"Poly-Cide" Removes Odors From Refuse Collection Equipment

338. Information on "Poly-Cide" formulations which will remove residual odors from refuse collection equipment with a simple rinse or spray is available from Brooks Chemicals, Inc., 3304 East 87th St., Cleveland, Ohio. Get full data by checking the coupon.

Check These New Features On Refuse Collection Bodies

383. The all-new Heil "Collectomatic" refuse collection unit incorporates the best features suggested by municipal operating crews, supervisors and private operators to provide easy loading, simple operating mechanism, bulldozer type packing, fast dumping and many other important advantages. Check them all by getting attractive Bulletin BH-54103 from The Heil Co., 3044 W. Montana St., Milwaukee 1, Wis. Your copy is ready—just check the coupon.

Combat Unpleasant Odors At Municipal Sanitation Sites

404. Malodors at municipal refuse disposal sites, waste treatment plants and incinerators may be effectively "neutralized" by the odor masking products of Rhodia, Inc. Be sure to investigate this means of eliminating complaints from unpleasant odors. Write Rhodia, Inc., 230 Park Ave., New York 17, N. Y. or check the coupon.

Spraying. The Universal 'Jeep', with power take-off, operates many types of sprayers and dusters. With the extra traction of its 4-wheel drive, the 'Jeep'-sprayer unit reaches remote places for mosquito and weed control work—over sand and soft ground—up 60% grades—where other vehicles can't go. But it shifts easily into conventional 2-wheel drive for speedy travel between jobs.

How the 4-wheel drive 'Jeep' family does more jobs better... faster!

Mobile power. With power take-off, the 4-wheel drive 'Jeep' Truck is a mobile power unit for operating many types of equipment, such as welders, generators and compressors.

Transportation. The 4-wheel drive 'Jeep' Station Wagon carries up to 110 cubic feet of equipment and supplies or 6 adults—supervisory personnel and workmen—wherever they need to go.

Maintenance. The 'Jeep' is an ideal vehicle for maintenance work, such as operating a grader blade. With power take-off, it operates almost any belt or shaft-driven equipment.

Members of the 'Jeep' family of 4-wheel drive vehicles are proving their value and versatility every day in every phase of public works and public service.

They spread their cost over an almost endless number of jobs, and their "go-anywhere" dependability is extra insurance in public emergencies.

Ask your Willys dealer for an on-the-job demonstration of these all-purpose, time-saving, money-saving 'Jeep' 4-wheel drive vehicles, or write for information.

The 'Jeep'® family of 4-wheel drive vehicles

WILLYS... makers of the world's most useful vehicles

WILLYS MOTORS, INC., TOLEDO 1, OHIO

Get full details of this month's products . . . mail your Readers' Service card today.

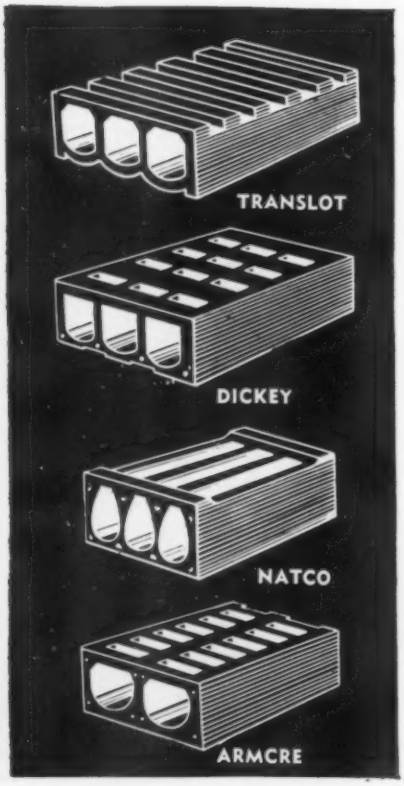
GARLAND, TEXAS, sewerage treatment plant includes one 65' primary clarifier, one 45' final clarifier one 100' high rate trickling filter, two 110' standard rate filters. Designed by Homer A. Hunter, Consulting Engineer, equipment by Ralph B. Carter, bar screen by Chain Belt Co. TFFI blocks by Texas Vitrified Pipe Company.

Why Trickling Filters are best—

EASY TO EXPAND

Trickling filters, properly designed, are easy to expand to meet future increases in population or loading. Another filter, or perhaps a change from low rate to high rate, will solve the problem for many years to come.

You'll be sure to get maximum results from trickling filters when you install TFFI *vitrified clay filter bottom blocks.* The full illustrated story of their advantages, efficiencies, and economies is in the new 1954 revised edition of the popular HANDBOOK OF TRICKLING FILTER DESIGN. If you lack a copy, just write any member of the Institute listed below for one. It's free.



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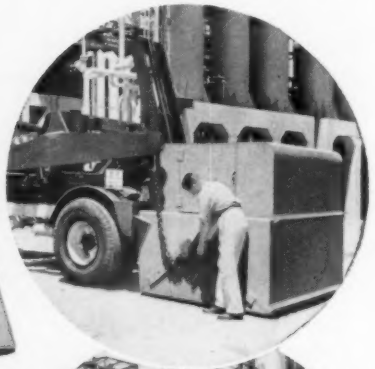
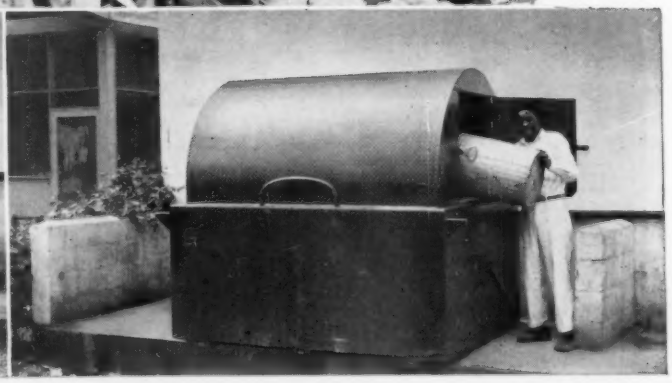
The Dempster-Dumpster is operated by only one man, the driver, by means of hydraulic controls in cab. It picks up a loaded container, hauls to disposal area, empties (see photos here) and then returns it . . . serving one container after another.





This Lexington, Ky. groceryman had gone to the added expense of building a concrete platform to keep cans and crates full of garbage off the ground. He had done all he could within reason to make the best and most sanitary condition possible with conventional cans. Yet, look at the difference after the 10 cu. yd. Apartment Type Container replaced all the inadequate cans, crates, barrels, etc.

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to the FOUR major bulk collection problems in any city!

1. UNSANITARY CONDITIONS: Health and Sanitation Departments are well aware of the disease spreading potential of unprotected rat and fly infested refuse.

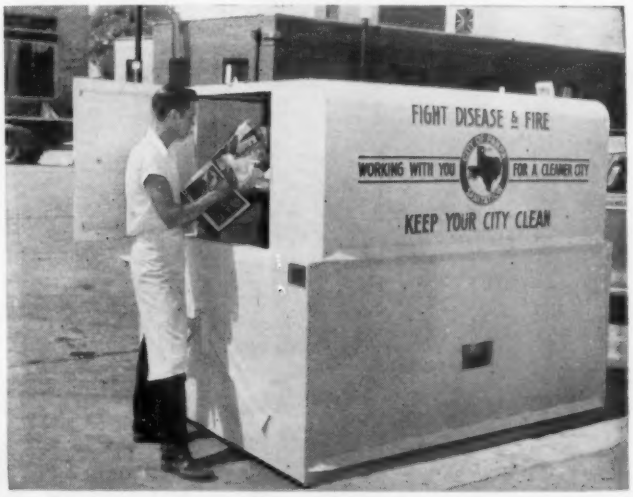
2. UNSIGHTLY CONDITIONS: Every citizen is conscious of the conditions caused by wind and scavengers scattering trash and refuse over alleys and streets.

3. FIRE HAZARDS: Fire Departments know too well the extent to which property is damaged and gutted by fires resulting from unprotected accumulations of trash, rubbish, inadequate trash cans, boxes, etc.

4. HANDLING COSTS: The cost of crews in the slow process of re-handling and loading trash and refuse is tremendous. Conventional trucks standing idle, waiting to be loaded, is a costly waste of equipment time.

All four of these bulk refuse collection problems can be quickly and completely solved by the Dempster-Dumpster System. Problems one, two and three are solved by the big steel Dempster-Dumpster Containers. These containers have self-latching doors and lids, keeping refuse out-of-sight between deposits by users. No rats or flies can contaminate the refuse. Winds and scavengers cannot scatter it. Fire hazards are eliminated. The fourth problem, rehandling costs, is solved by one truck-mounted Dempster-Dumpster and the driver serving numerous containers one after another.

Actual reductions in collection costs have ranged from 50 per cent up in cities where the Dempster-Dumpster has been installed. Without question, this system is recognized as the most sanitary and lowest cost method of bulk refuse collection ever devised. When, with this system, you can be assured of amazing cost reductions in service, with Sanitation, Citizen approval and Fire Prevention thrown in, it is worthy of investigation. Ask us to forward further information. Manufactured exclusively by Dempster Brothers, Inc.



The scene above was photographed in Pampa, Texas after the Dempster-Dumpster System was installed last year. One Dempster-Dumpster serves 33 detachable containers, ranging in capacity from 8 to 12 cu. yds. This equipment will be completely amortized by the city by savings in about four years.

The two photos at left show what happens when the Dempster-Dumpster Detachable Containers replace conventional cans in a typical housing area. Without the trash and garbage cans this area is an ideal place for children to play. Note that one 6 cu. yd. Apartment Type Container replaced some 14 conventional cans. Instead of a conventional truck with crew rehandling the refuse from cans to truck, a Dempster-Dumpster with only one man, the driver, will serve the loaded containers. There is no rehandling of refuse whatsoever.

THE DEMPSTER DUMPSTER® SYSTEM

DEMPSTER BROTHERS
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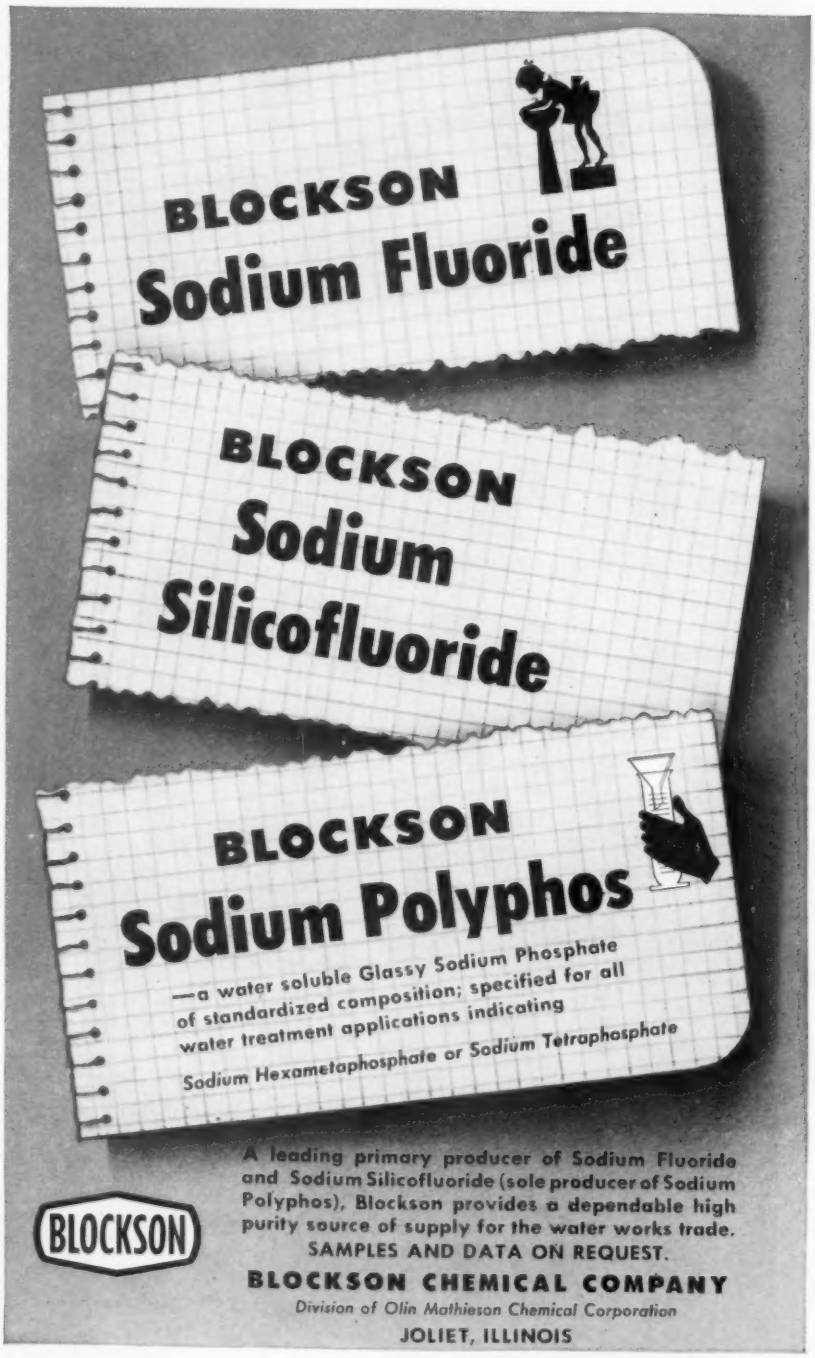
Knoxville 17, Tennessee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Yes, the Tractair unit can do 101 odd jobs for you, save you money on all of them, and you don't have to tie up trucks or men to use it. So write for our latest literature and find out how the versatility of Le Roi Tractair can help you cut costs on a wide variety of jobs.

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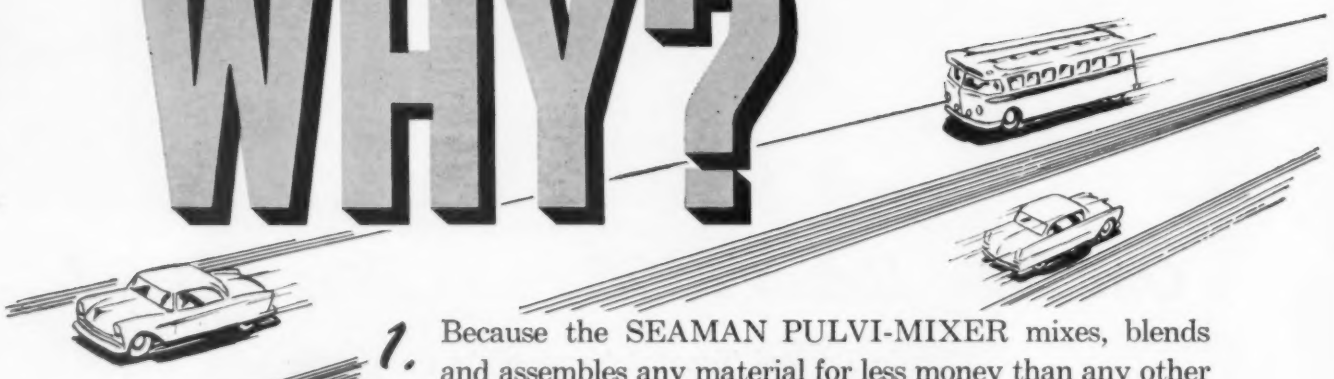
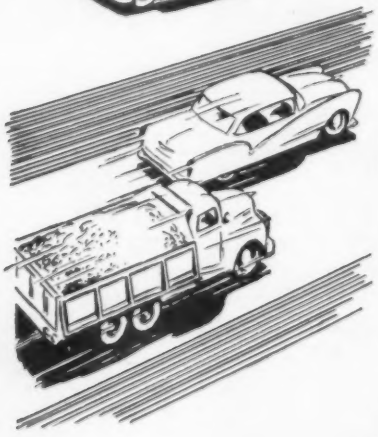


1. Because the SEAMAN PULVI-MIXER mixes, blends and assembles any material for less money than any other in-place mixing equipment—your cost per square yard is lower.



2. Because the materials *are blended and properly assembled*, gravel segregation (the unstable separation of coarse and fines) is corrected. Thus, the Seaman-built base or subbase compacts to higher densities with a far greater resistance to ravages of weather and traffic . . . a higher *quality* of mix at lower cost.

3. Original investment is lower, therefore fixed charges (interest, depreciation, etc.) are substantially less.

4. Savings in maintenance costs on Seaman-built roads are so substantial that those dollars can be channeled into new road programs.

A comprehensive Seaman-Andwall Bulletin recently issued describes Seaman-mixing and Seaman equipment in interesting detail. Illustrates many field scenes and different types of stabilization. Send postcard today. Ask for Bulletin TPS.

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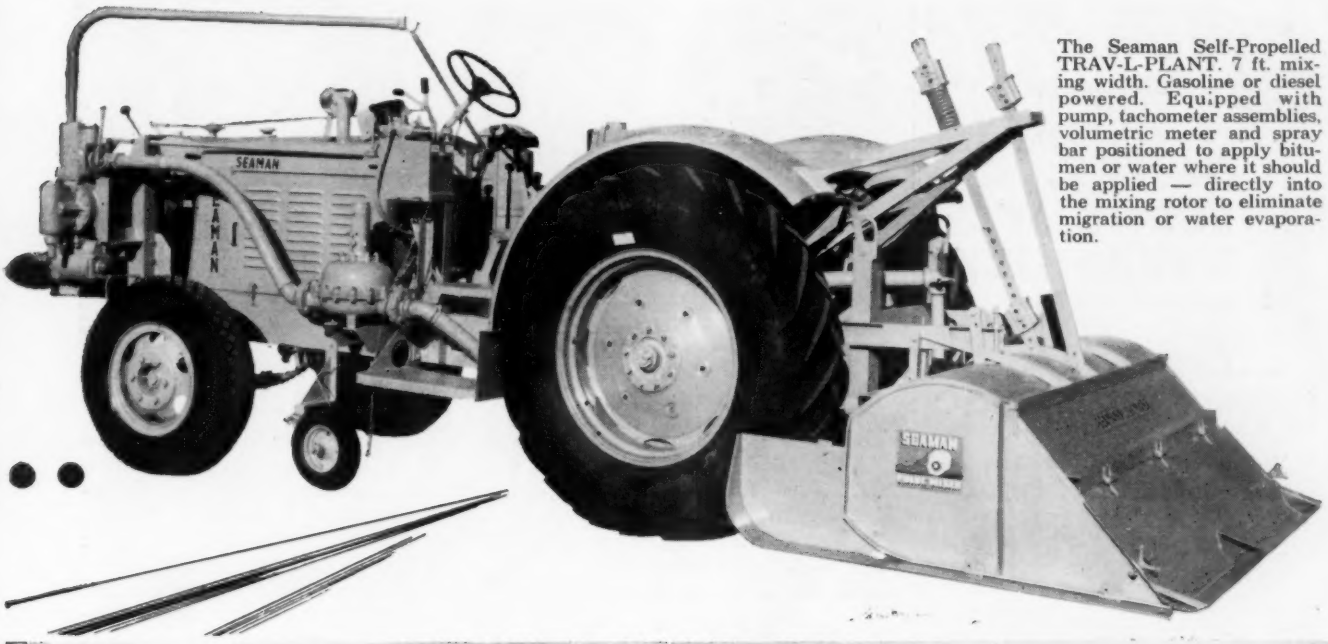
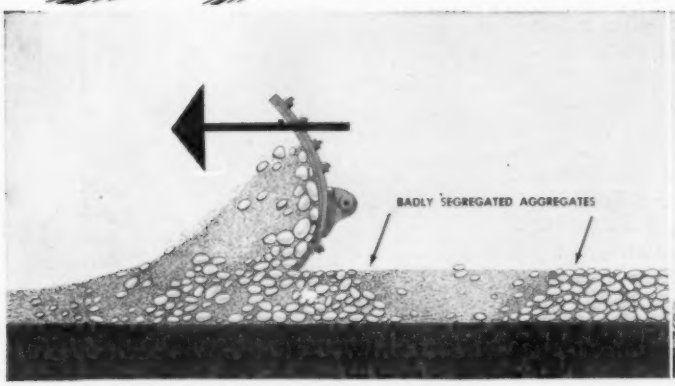
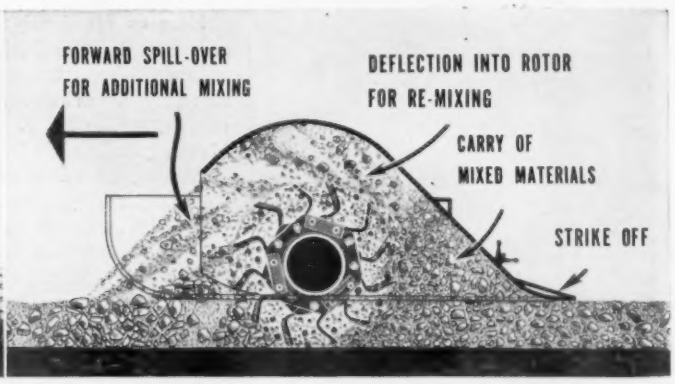


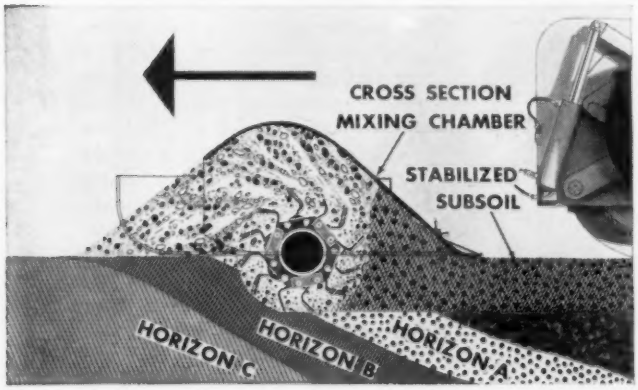
The Seaman Self-Propelled TRAV-L-PLANT. 7 ft. mixing width. Gasoline or diesel powered. Equipped with pump, tachometer assemblies, volumetric meter and spray bar positioned to apply bitumen or water where it should be applied — directly into the mixing rotor to eliminate migration or water evaporation.



When gravel is dumped on a roadway, larger stones fall first. Next come the fines. Thus alternate pockets of coarse and fine are formed. When these are bladed for mixing this segregation is made worse and the pavement will soon break up.



But when the Seaman Pulvi-Mixer is used, that unstable segregation (always present when aggregates are transported, moved or pushed) is perfectly blended and the materials are properly assembled so that the coarse stone is keyed and interlocked and the voids are filled with the fines. Thus the stone is securely mortared-in. A Seaman-built base or sub-base lasts for years.



Sub-grades have their own types of segregation for they consist of soils of varying characteristics and varying reactions to moisture. Only by blending these with the Seaman Pulvi-Mixer can uniformity in moisture, density and thickness be attained. And only then have you built a low cost SUB-BASE that reacts uniformly to weather and pounding traffic.

Here is a typical pavement failure due to two conditions: (1) an unstabilized sub-base that failed because of moisture permeation; (2) a segregated condition of the aggregates when the base course was inadequately mixed. Both these causes could have been prevented with the Seaman PULVI-MIXER.

Your Seaman-Andwall distributor has these cost and performance facts ready for your investigation. Call him now to get full advantage of the Seaman Pulvi-Mixer this season.

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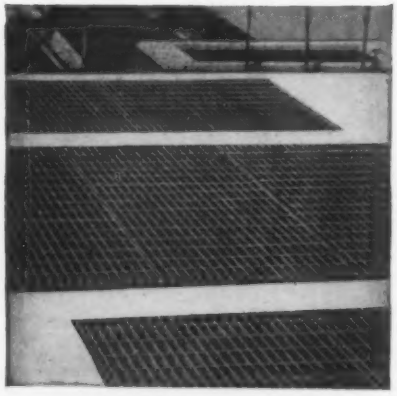

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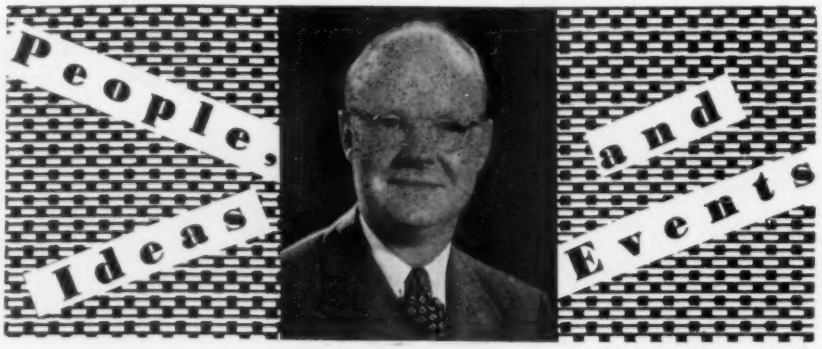

by "Doc" Symons

H.T.M.A.—And maybe instead of writing H.T.M.A. I should write H.T.M.F.T.L.T. meaning Here's That Man for The Last Time; for this is my last column—but more about that later. Right now, there's some unfinished business, to wit:

★ ★ ★

More on Fluoridation—You will recall that in the June issue of this column I reported some uncomplimentary remarks made about fluoridation, at the N. Y. Sect. (AWWA) Meeting in Buffalo in April, by Ben. C. Nesin, Director of Laboratories, New York City Water Dept.

In the July issue, I said that I hoped to have a statement from Dr. Jules S. Cass, Principal Investigator, Kettering—ORSANCO, inasmuch as (1) The Kettering Laboratory has more information on the subject than any other organization and (2) Dr. Cass had raised some objections at Purdue University when I quoted Mr. Nesin.—I am happy to say that Dr. Cass has supplied me with a statement on the subject of fluoridation and on Mr. Nesin's comments in particular. Here it is in its entirety.

"Memorandum to Dr. Symons regarding the statements reported to have been made by Mr. Nesin of New York City concerning hygienic aspects of fluoridation.—

"The addition of fluorides to water for the prevention of dental caries has been studied extensively in relation to hygiene. A large number of leading medical, dental, and public health organizations, for the purpose of guiding their members, have with the aid of expert research workers and clinicians reviewed, studied, and decided whether the addition of this chemical to water is safe. These groups, each working separately, have approved the practice without exception, basing their judgment upon attainable knowledge of the subject, and upon their own experiences. Members of these groups, representing organizations such as the American Medical Association, American Dental Association, American Association of Public Health, United States Public Health Service, American Waterworks Association, have continued to review new and previously unexamined information and are most willing to reconsider their past decisions.

"Mr. Nesin, it is said, mentioned evidence which raised questions in his mind regarding the fluoride program. The data which he draws upon to uphold his opinion should be examined critically, as should any information which contributes to our present knowledge. If Mr. Nesin, who would be responsible for carrying out the fluoridation program, should it be undertaken in his area, has questions about its safety, it would seem logical for him to seek the answers from those who, from working with fluorides, and from studying their effects on man, would be best prepared to give him such information and guidance.

"The matter is not one for debate, but for education. One seeks a lawyer for legal advice, a sanitary engineer for waterworks and engineering problems, and a physician for medical care. There are people specifically experienced in working with the problem of the hygienic safety of water containing fluorides. They are anxious to study new or to review old evidence. An exchange of questions and answers across the table would be far less confusing than an oratorical or journalistic exercise, and in the long run would best benefit man which ever way the facts may fall."

★ ★ ★

In his letter of transmittal of the above statement, Dr. Cass wrote "Thank you for the privilege of permitting me to participate in your thinking about this matter. I hope that my viewpoint might be useful."

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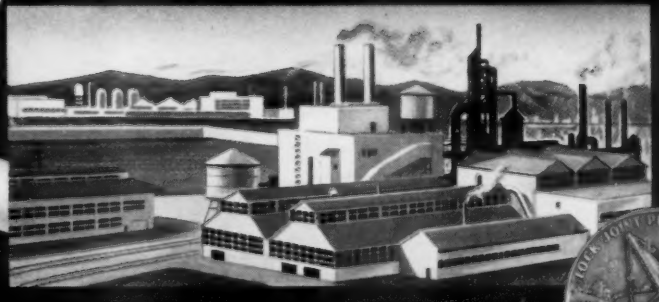

This pipe retains its initial high carrying capacity throughout an exceptionally long life, is low in initial cost, and requires very little, if any, maintenance. More important still, its record for unfailing, trouble-free service is unexcelled

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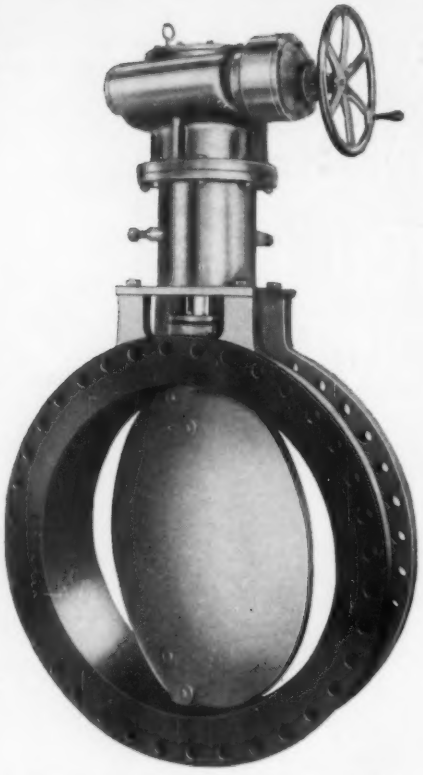
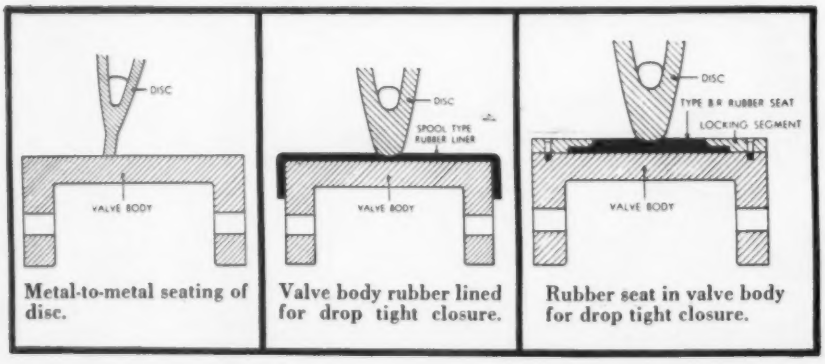


42"—125# butterfly valve with hard chrome edged disc, stainless steel shaft, bronze bearings and enclosed worm gear, handwheel operator. Valve body lined with rubber for drop tight shut-off at 140 p.s.i. water pressure.



Metal-to-metal seating of disc.

Valve body rubber lined for drop tight closure.

Rubber seat in valve body for drop tight closure.

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Indeed it has, Dr. Cass, and I'm truly appreciative of your thoughts —And lest you or any of my readers read into my June column the idea that I personally agreed with or approved of Mr. Nesin's comments, let me hasten to dispel any misunderstanding of my attitude toward fluoridation.

In presenting Mr. Nesin's comments, perhaps I should have included them in quotations in order that they not be mistaken as my ideas. To the contrary, I still personally believe in fluoridation and shall until such time as Mr. Nesin's contentions are proved; nevertheless I feel that opponents of fluoridation of the professional standing of Mr. Nesin and Mr. Riddick are entitled to be heard and answered. Dr. Cass' suggestion for "across the table discussion" of the questions strikes me as being highly desirable.

★ ★ ★

And still more on Fluoridation—While the fluoridation controversy smoldered at the AWWA meeting in Chicago, it is of interest to note that the AWWA policy toward fluoridation was reviewed and reaffirmed as had been done in 1951, and 1952.

In a meeting of the Officers and Directors on Sunday, June 12—in which a number of Section Chairmen and Division Chairmen participated—the previous policy statements of the Association were reviewed and again reaffirmed.

The action in the meeting on June 12 was unanimous. For the record, the Association's expression of policy is as follows:—

"In communities where a strong public demand has developed and the precedure has the full approval of the local medical and dental societies, the local and state health authorities and others responsible for the communal health—water departments or companies may properly participate in a program of fluoridation of public water supplies. Recommendations for fluoridation are prerogatives of the dental, medical and public health groups. When the proper authorities approve the treatment, it then becomes the function of the water works utility and industry to follow through willingly and intelligently where proper controls are assured."

★ ★ ★

And Now So Long—for a while, anyway—I want to thank "Bill" Hardenbergh for the very nice things he said about me in the lead editorial of the July issue of Public Works.—

A GENERAL FILTER WATER TREATMENT PLANT WILL FIT YOUR NEEDS LIKE A *Prescription!*

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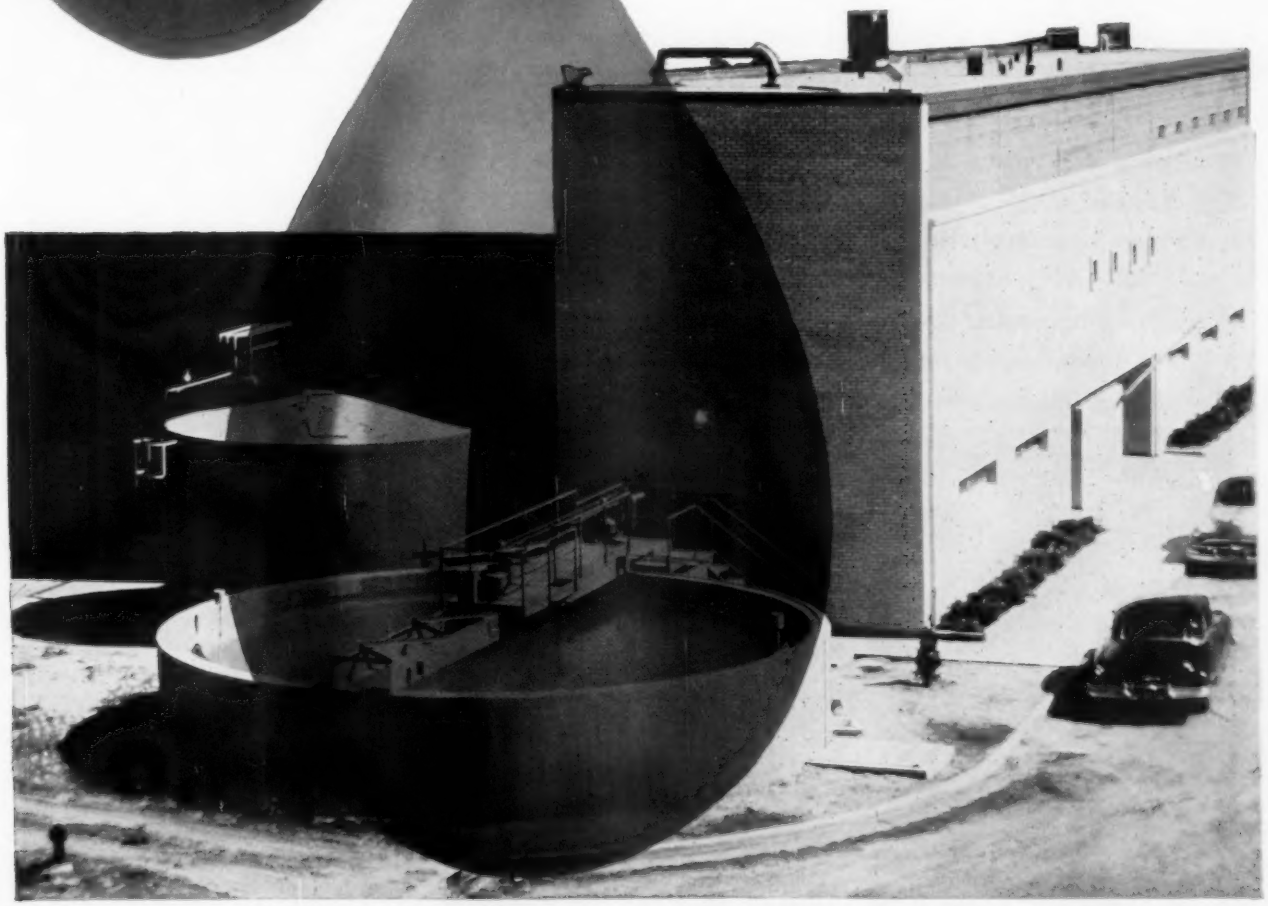

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LEVITTOWN, PA. uses AIRPLACO gunning equipment for fast, efficient sidewalk and curb repairs. Bondactor and Mix Elvator team up to form easy-to-use portable rig.

For Any Type of Concrete Restoration and Maintenance You Save with

AIRPLACO GUNNING EQUIPMENT

BONDACTORS • NUCRETORS • MIX ELVATORS

Public works officials all over the country have learned that budget dollars go much, much farther, when they use AIRPLACO concrete gunning equipment. AIRPLACO equipment out-performs all other methods for street, sidewalk and curb repair . . . restoration of bridges, ditches, culverts and retaining walls . . . storm and sanitary sewer repairs and countless other uses.

AIRPLACO equipment is available in sizes from ½ to 6 cu. yd. of aggregate per hour. Write today for full information on the Bondactor, Nucretor or Mix Elvator and the name of your nearest distributor. Please state intended use.

LEAVENWORTH, KANSAS solves sewer restoration problem with AIRPLACO equipment. Limited access to working areas offer no problem for this highly versatile equipment.

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It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

Believe me, writing a column for *Public Works* Magazine has been one of the most pleasant things I have ever done. No one could ask for a better, more understanding or more cooperative group to work for. I regret, exceedingly, that I must give up writing this column, but the pressure of other commitments makes it impossible to continue.

Not only am I giving up the column, but also I have given up my work as a Research Associate in Civil Engineering in the Research Division of New York University and it is quite likely that my free lance consulting and writing will be curtailed. All this because of expanded assignments for two clients of long standing.

★ ★ ★

I shall miss—These monthly visits with my readers, I shall especially miss the fun of sharing a "Swedefinition" with you. In case you didn't know, the Swedefinition was named for C. C. (Swede) Larson, Supt. of Water Filtration and Sewage Treatment at Springfield. It was "Swede" who supplied most of these definitions and many more highly amusing but not highly usable. My thanks to you Swede; I hope you continue to collect such gems as "A meteorologist is a fellow who can look into a girl's eyes and tell whether".

★ ★ ★

I shall miss, also—Writing about the Society of Council Bluffers, that "intrepid" band of conventioneers who shared a private car on the trip to the San Francisco convention in July 1947.

★ ★ ★

And I shall miss, especially—The News Notes from Brushy Bend. Inspired by a column in a country newspaper for which I once wrote, this monthly feature gave some recognition to the many small local groups which gather regularly and faithfully to discuss mutual problems of water and sewage works.

★ ★ ★

And finally—but somehow I have the feeling that this is not final—Knowing my own predilection to take the nearest pen, pencil or typewriter in hand and write, and knowing Bill Hardenbergh's soft heart for scriveners of my ilk, I may "see" you again in a letter to the Editor. Meanwhile—so long for a spell—

V.T.Y. — Doc Symons

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Do you have a waste-treatment problem?

. . . If you do, you'll want this book

Here's the story of a new highly efficient flotation system that may well solve your problem... whether you're removing suspended solids from waste liquids...or recovering valuable materials from process liquids.

Bulletin No. 54-82 describes the unique new Rex Float-Treat System...a process employing millions of minute air bubbles to remove suspended matter by flotation efficiently and economically. The Rex Float-Treat System is a packaged unit based on sound, time-proven hydraulic principles...adaptable to either concrete or steel tank construction. The informative bulletin shows typical Float-Treat Systems for a number of different applications...covers the many advantages in both cost and results...indicates what the Float-Treat System will do.

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This rugged, yet compact Champion harnesses 14.6 horses to get clean, straight bites in asphalt, green and cured concrete. Champion's compact and perfectly balanced design produces speedy cuts, saves important on-the-job time and labor costs, maneuvers easily in confined areas...cuts right into closest corners with Champion's "either-side" blade arrangement. Ask your distributor about the Champion or write direct. Champion's labor and money-saving features are worth checking into!

- Powerful 14.6 h. p. Gasoline Engine.
- Non-Sway Ball-Bearing Solid Rubber Wheels.
- Positive Screw Feed with Adjustable Positive Depth Stop.
- Dual Purpose Blade Guard for Either-Side Cutting.

Sidewalk Patching with a Champion. Even well-cured, dense concrete like this is zipped through faster — and for less — by a Champion.

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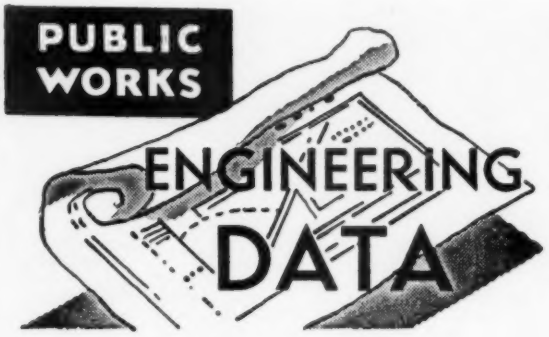

Maintenance Report of New Hampshire

Local conditions, climate and traffic vary widely from state to state, nevertheless readers may be interested in the following data compiled by L. F. Johnson, Maintenance Engineer, New Hampshire State Highway Department on maintenance expenditures and pavement marking costs in New Hampshire. In the following table is an analysis of maintenance expenditures and cost of pavement marking:

Analysis of Maintenance Expenditures

Item	*Primary System % of Total*	*Secondary System % of Total*
Winter Maintenance	44.2	38.0
Patrol	25.6	27.6
Surface Treatment	11.7	21.6
Miscellaneous	9.9	0.6
Hurricane	5.8	8.0
High Water	1.4	3.3
Maint. Specials	1.4	0.9
	100.0	100.0

Pavement Marking

Cost per foot (Std. Paint)	$0.00474—Cost per mi $25.02
Cost per foot (Beaded)	$0.00903—Cost per mi $47.67
Cost per Stencil	$0.6738
Cost per foot of curbing	$0.00636

• • •

Citrus Waste Treatment

In a new phase of the project on the treatment of citrus waste at the University of Florida, which has been under investigation for several months, part of the effluent from the sedimentation tank is being treated on a pilot-plant scale trickling filter. The filter, in which waste wood blocks are used as the medium, is 10 feet in diameter and 6 feet deep. Ammonium nitrate is added to the citrus waste to provide about 20 parts per million of nitrogen before distribution to the filter. A characteristic biota has gradually developed. The initial growth was composed predominantly of bacteria. Continued loading brought the yeasts into ascendancy, but the growth contains many fungi and certain desirable protozoa. It is believed that as loading continues the biota will stabilize, with those organisms most capable of oxidizing the fortified citrus waste in the majority.

The filter is being loaded at a rate of 9.3 pounds of BOD per cubic yard per day with a recirculation ratio of 7:1. Under these operating conditions, a reduction in BOD of 40 percent is reported through the filter and final sedimentation tank.

MILWAUKEE 1, WISCONSIN

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ORTHOSOLV*

The Chlorobenzene that MIXES WITH WATER

For Low-Cost, Easy Use!

Typical Applications of ORTHOSOLV

- Incinerator smoke
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- New excess-capacity sewers
- Drainage ditches
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- De-watering of sludge
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- Dog kennels
- Rendering plants

NOTE: ORTHOSOLV can be safely recommended to private individuals or business concerns for the elimination of odor-causing conditions.

ORTHOSOLV is a concentrated, 100% active material which affords effective odor control even when diluted with as much as *1 part to 100 parts of water!*

It has been used and proven effective in controlling odors from a wide variety of sources in municipalities all over the country.

ORTHOSOLV solutions are *low in cost* and easy to use with street flushers, pressure pumps and hand sprayers.

If you have a particular odor problem, write us giving details and we will be glad to send you our recommendations for controlling it. For FREE LITERATURE and TEST SAMPLES** use coupon below.

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Orthosolv is also a highly efficient water dispersible solvent-cleaner for the removal of:

1. Grease and tar from trucks and equipment
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Orthosolv can be removed with a water flush or a steam jenny. Orthosolv is safe. It has a high flash point and is not a fire hazard.

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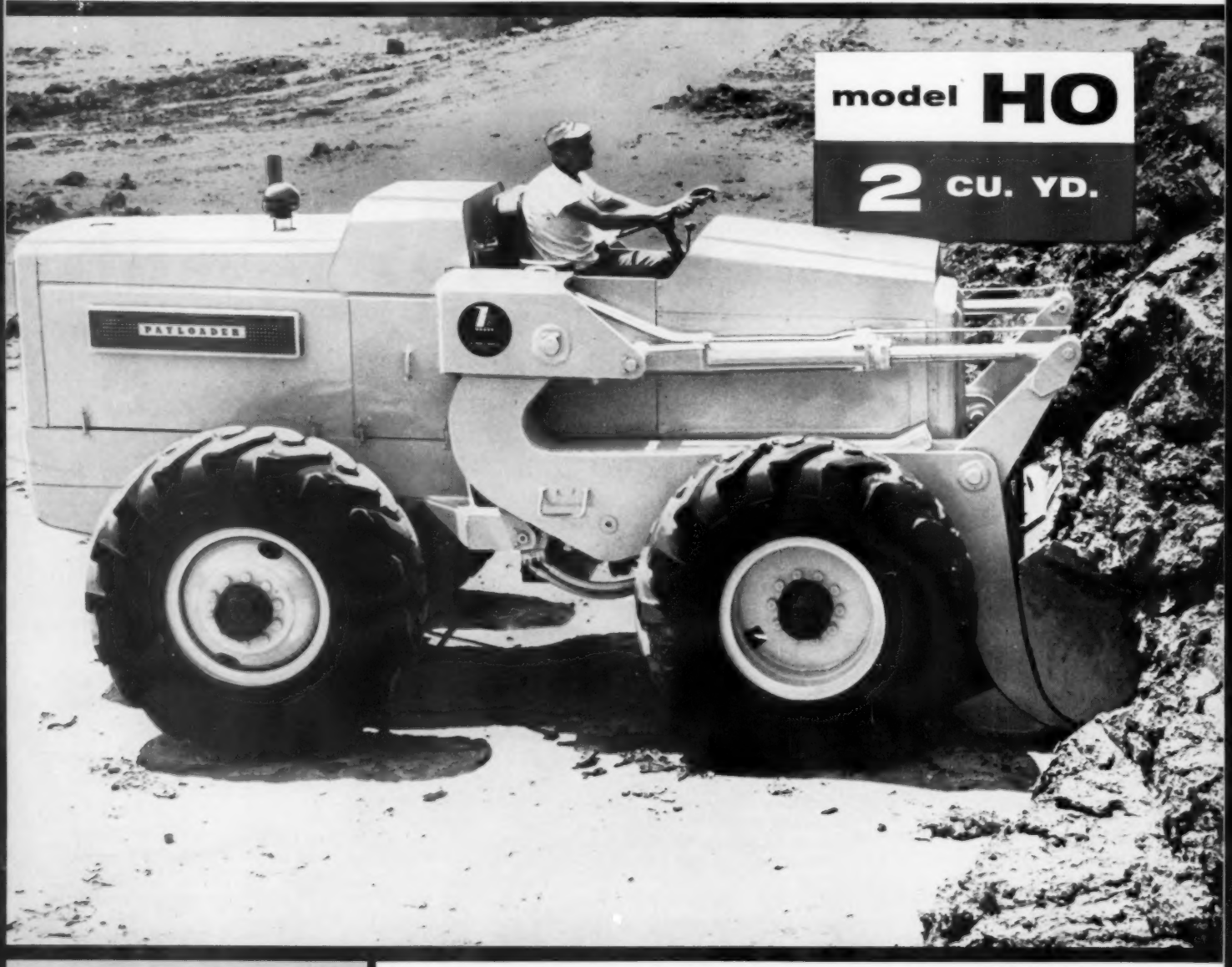

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Makes ALL Shifts WITHOUT Stopping!

This "PAYLOADER" has a newly-developed power-shift transmission which is the easiest-operating, fastest-acting, most efficient ever put into a tractor-shovel. Shifting from *any* speed range to *any* other is accomplished instantaneously by fingertip action — *on the go* — there's no stopping, no "clutching". Directional shift (forward and reverse) is just as easy and just as fast. All speed ranges are provided in reverse as well as forward. Also included is a highly-efficient polyphase torque-converter that matches engine speed and torque to the load *instantly* and multiplies the engine torque up to 350%.

• with more digging power
• with faster operating cycles
• with easier, safer operation

YOU'VE never seen anything like this big new "PAYLOADER" — because there *is* nothing else like it. Nothing else like it in design — nothing like it in performance.

No other tractor-shovel gives you the tremendous digging power; the ability to get and keep heaped bucket loads under all conditions; the *complete* power-shift transmission which speeds operating cycles; the balance and stability to handle big loads fast, safe and easy.

If you want big, steady output — dependable performance hour after hour, put this husky HO on your jobs and you'll see the difference. Stop in at your nearest "PAYLOADER" Distributor and look it over.

HOUGH-DESIGN HOUGH-QUALITY

Safety and Stability. Special boom-arm shape and positioning keeps moving members out of operator's reach at all positions. Close, low, load-carry position and longer wheelbase provide stability and balance for fast maneuvering — with safety.

More Horsepower per bucket capacity than other standard models. Either gasoline or diesel power available.

Easy to Operate. Fullest operator visibility for safe, fast maneuvering; power steering; power-shift — no "clutching"; 4-wheel hydraulic brakes — vacuum boosted; foam rubber molded seat and back cushions; seat adjustable for operator comfort; longer wheelbase adds to rider comfort.

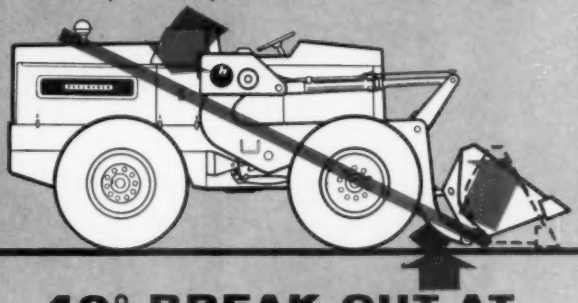
Superior Hydraulic System. Sealed, pressure-controlled hydraulic system to keep dirt and air out of oil; double-acting, long-life hydraulic rams with chrome-plated piston rods, and highest quality oil lines and fittings.

Fully-Equipped. Standard equipment includes: built-in headlights, back-up lights and tail lights; 12 volt electrical system for gas-powered units.

Extra Equipment for Greater Usefulness. Bulldozer blade, special buckets, bucket teeth, crane hook and lift fork attachments; snow plows, backhoes and many other useful and special accessories will be available.

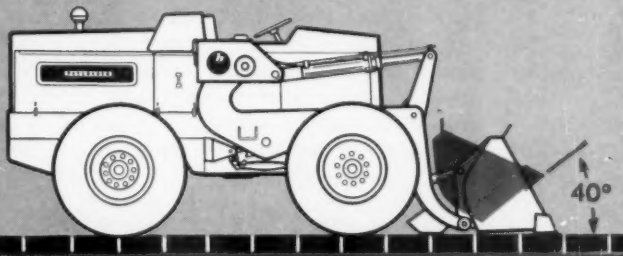
POWERFUL PRY-OUT ACTION

Tremendous pry-out force is obtained by using the breakout pads on the ground as a fulcrum for leverage. The load forces opposing the pry-out action are thus transferred to the ground through the pads instead of to the axle, wheels and hydraulic system of the machine.



40° BREAK-OUT AT GROUND LEVEL

You can get HEAPED BUCKET LOADS and you get them FASTER and EASIER WITH THIS NEW BUCKET ACTION. Most important of all — you KEEP BIGGER PAYLOADS — because the bucket can be tipped back a full 40 degrees at ground level before it is raised, eliminating spillage.



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how to clear your streets IN A HURRY!

Barber-Greene Snow Loaders remove snow at 7-11 yards per minute

The time to remove snow is right after it falls. Once you permit snow to thaw and refreeze into an unmanageable mass, fire and safety hazards multiply . . . traffic snarls . . . parking meter and business revenues decrease.

To clear your streets in a hurry, look to the Barber-Greene Model 544 Snow Loader. This proven machine removes snow at a 7 to 11 yard-per-minute clip . . . keeps even the largest trucks moving in a continuous production line requiring only a single traffic lane . . . moves quickly from one location to another.

Whether yours is a city of 3,000, 300,000 or 3,000,000, now is the time to see your B-G Distributor. He'll demonstrate, with facts and figures, how the *Model 544 will pay for itself.*

Features of the B-G Model 544 SNOW LOADER

- One-Man Operation
- Loads and Trims Long, High-Sided Trucks
- Low Clearance—12' 0"
- Loads Over Cab or with Trucks Alongside
- Hydraulically Controlled Swivel Conveyor
- 15 M.P.H. Road Speed
- Delivers 7-11 Yards per Minute
- Ample Traction and Stability

Other uses for the B-G Model 544 SNOW LOADER

After the snow season, the B-G Snow Loader, a year 'round machine, handles coal, leaves and other nonabrasives. Also, it can be converted into a Bucket Loader to handle aggregate materials.

DON'T DELAY...SNOW WON'T

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PUBLIC WORKS MAGAZINE AUGUST 1955

GOOD ROADS

Don't Just Happen

JAMES F. MEISNER,
County Engineer,
Marion County, Kans.

WE ARE located in the central part of Kansas. Agreeable climate, for it changes every day and if you don't like the climate today, be patient, for it will be different tomorrow. Nonmonotonous, for in 1951 we had the worst flood in history, and in 1954 we had the driest year in history, yet, in spite of the 1954 drought, we had one of the largest wheat crops in history.

On top of all this, we have good roads. Good roads for the free movement of people from farm to city, farm to farm, and city to city. Free movement that means friendliness, enlightenment, happiness and contentment. Those are the attributes that make the best kind of people in the world.

Good roads don't just happen: they aren't the sole product of the County Commissioners, who provide the authority and finance; the Engineer, who directs the work; or the Road Employees, who prosecute the work. They are the product of these three, together with the people who pay the bill, and more important, enthusiastically back up the three, with their cheers, their help and their cooperation.

Now, before we go into the mechanics of our highway department, let's have a brief look at some dry statistics so you may compare our problem with yours. First, we are a county of 17,000 friendly people living in an area of 954 square miles. We have an assessed valuation of $46,000,000, and I believe that is on approximately a 30 percent actual value basis. We have 1652 miles of road under regular maintenance, of which 975 miles have all weather surfacing. This surfaced mileage serves 88 percent of our rural homes. Our prime industry is agriculture and stock raising, with a scattering of oil fields almost all over the county.

Our highway finance comes primarily from an advalorem tax, which varies from year to year, of around eight and one-half mills, together with an apportionment of approximately $37,600 from the state gas tax to be used in our regular road and bridge fund. Besides this, we receive $50,000 per year from a special one-cent gas tax. This money is earmarked to be used for the matching of an equal amount of Federal Aid to be used on not to exceed twenty to twenty-two percent of our public roads designated as our Secondary Highway System.

This year we will have $452,392 in our regular Road and Bridge Fund and $50,000 in our Secondary Road Fund. This amounts, with Federal Aid, to approximately $330 per mile of road under maintenance —truly not a very imposing figure when you realize that this is to pay for maintenance and construction on both roads and bridges and that the $50,000 for Secondary Roads is for limited use.

How has Marion County accomplished so much with so little? By the combination of the four forces mentioned above.

The greatest local impetus to good roads came in 1946 when, on petition of the people, the county abandoned the township responsibility for road maintenance and construction. Up to that point the county had less than twenty-five miles of township road surfaced. There had been no program of grading and drainage; no uniformity in travelway width; no dependability that any given length of road would have comparable maintenance or standard of construction. Townships that had good equipment didn't have enough money left over after making payments on equipment to afford to operate it.

Marion County, on adoption of the "County Unit System", chose to make a slow change-over in the system. Today, eight years after the adoption of the "Unit System", we have eliminated township lines in road construction and maintenance and provided better, more uniform maintenance at a saving of five maintenance units. We have increased the total surfaced mileage from about 300 miles to 975 miles and have graded and drained a network of roads that, with compara-

● GOOD RECORDS are important when 1652 miles need maintenance.

MARION COUNTY HIGHWAY DEPARTMENT

BITUMINOUS SURFACING RECORD

SHEET NO. ____

NAME OF ROAD ____ THEO. SPREAD: PEN ____ 1st SEAL ____ RE-SEAL ____ G/SY

LOCATION ____ COVER: TYPE ____ 1st SEAL ____ RE-SEAL ____ lbs./SY

TRANSPORT RECORD OF BITUMEN					BITUMINOUS APPLICATION RECORD										COVER APPL. RECORD		
Date Delivered Applied	Refinery	Inv. No.	Type	Gallons	Location Mile	Location Side	Location End	Broomed Watered	Temp.	Gallons	Distance	Bar Width	Sq. Yds.	Gal./S.Y.	Tons	Rate	Weather—Remarks

● **MODERN SHOP at Marion, Kansas, helps keep County equipment in good shape.**

tively few exceptions, are dependable as to standard of construction, maintenance and design.

It is natural, of course, with a comparatively small budget per mile of roads, that we do not have any particular projects that we point to with pride because they are large, expensive, or outstanding. Our point of pride is in our overall road picture.

Organization

In general, our crew consists of approximately 54 employees: twenty-five being maintenance and construction men, three mechanics, two in the office and the other twenty-three on trucks, and work crews. We normally contract our surfacing, project resurfacing, and the construction of large bridges. We use our own trucks for spot resurfacing and scattered work where it is impractical to contract. We do all our own grading, and culvert and small bridge work by force account.

Administratively, this work is under the direct supervision of the Engineer, with the assistance of an Assistant Engineer, and a Field Superintendent. The office force consists of a Clerk and Bookkeeper. Information from the field is gathered by the employees in a "Daily Motor and Labor Distribution Diary" submitted monthly. Shop repairs, which include all repair work on our heavy equipment and such repairing on our trucks as time permits, are reported on shop repair reports. In general, most car and truck repairs are made in commercial repair shops within the county.

We carry on our work with a minimum of actual supervision. We work hard, administratively, to sell the employee on the idea that he is an integral part of our road program; that he isn't hired to work so many hours at a specific rate; but that he is hired to perform and be responsible for a certain phase of the work. To implement this, we and of men working in all parts of the county. We talk over our problems, briefly, but in these meetings we definitely shy away from controversial problems. They do not all work out of the central shop area, therefore, it is only in these meetings that it is possible to coordinate all our men and their work. Our administrative supervision is careful not to destroy incentive in the work. We tend to supervise final results and economy of work rather than individual methods of performing the work. We find we can occasionally learn a thing or two from our employees, if we do not throttle their incentive with rigid sets of detail rules.

In general, we have adopted a policy of stage construction. Our first interest after the adoption of the "Unit System" was to see that our people were all connected with a good system of graded roads. Our standard called for 26-foot Secondary and County Roads, and 24-foot main township roads and 20-foot shoulder - to - shoulder width on minor township roads. In this phase

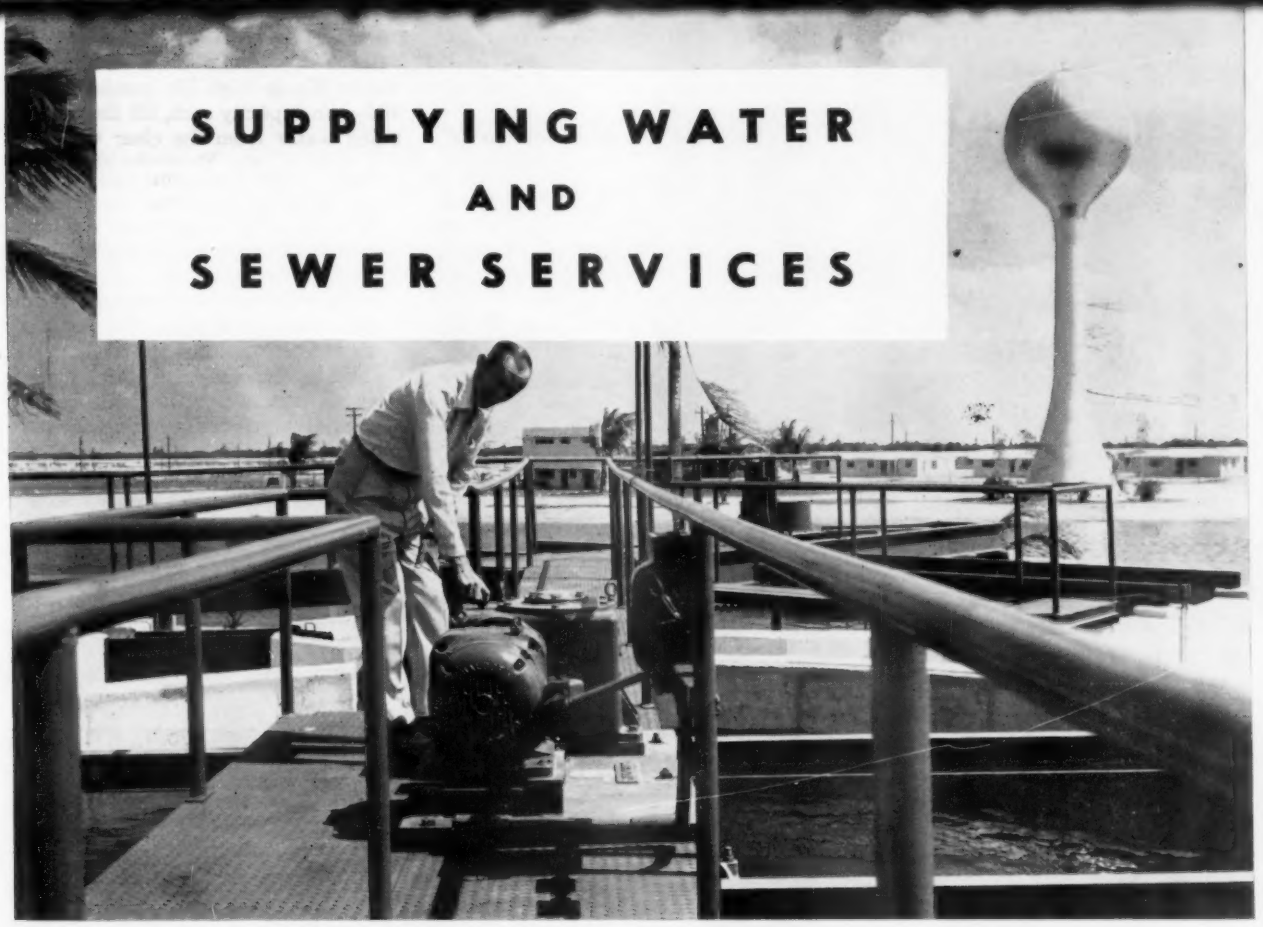
(*Continued on page* 161)

● **BRIDGE CONSTRUCTION and maintenance is included in the County road budget.**

sponsor monthly meetings of our employees throughout the winter months for the specific purpose of creating good will between the employees; between the employees and the administration, and the commission. As their Engineer, I, personally, carry a 35 MM camera and take pictures of good and bad jobs,

● **FRESH asphalt on newly sealed County road is covered with gravel.**

SUPPLYING WATER AND SEWER SERVICES



● **SUPERINTENDENT William C. Tims of Carol City Utilities, Inc., inspects the drive mechanism for the Hi-Cone mechanical aerator installed in one of the two 30-foot aerator tanks for the Miami suburb's privately owned sewage treatment plant.**

For a 10,000-HOME Development

RECOGNIZING the health problem that would be created by the installation of more septic tanks and home wells in Dade County, Fla., the developers of Carol City, the 10,000-home model community there, included ample private utilities in their planning. Located 15 miles northwest of downtown Miami, Carol City will be a completely planned community with its own schools, churches and shopping centers; and also its own sewer system, sewage treatment and water supply. When completed three years from now, it will be Florida's ninth largest city.

Builder of Carol City is Julius Gaines, president of the Gaines Construction Co. His utility plan seems to reflect a growing trend in king-size developments in the Florida area to provide their own water and sewage facilities. Wishing to maintain their present favorable low tax rate, the Dade County Commissioners encouraged private financing of the community facilities. Carol City's developers saw an opportunity to provide first-class service for their planned community and, at the same time, realize a reasonable profit from the operation of the plants which will serve 10,000 families.

Carol City will have the most modern and largest private water and sewage treatment plants in the South, when these are completed. The units now in operation have sufficient capacity to serve 1500 homes. Plans are now being prepared by the consulting engineers, Gilbert Clifford & Associates of Miami Springs, which provide for an ultimate expansion to serve as many as 15,000 families in Carol City and the contiguous areas.

Cost of the first section of the plant was $450,000; estimates of the final cost for facilities to serve the ultimate 15,000 families approximate $4,000,000. The expense of constructing the water and sewer lines have been passed along to the homeowners, but Carol City Utilities, Inc., expects to pay for the treatment plant costs by service charges on the 15,000 customers that will be served.

There are two treatment plants, one to soften, filter and chlorinate the water; the other to treat the sewage from Carol City and the neighboring areas. The two plants are in a utility area and face each other from opposite sides of a 2½-acre artificial lake.

Sewerage Facilities

The sewage collection system is of vitrified clay pipe, 6-inch to 15-inch. Due to the flatness of the terrain, pumping stations are required at frequent intervals. These are of the pneumatic ejector type, supplied by Yeomans. A forced draft blower at each station forces air into the sewer line to prevent the accumulation of gases, provide ventilation and eliminate the possibility of odor.

The existing sewage treatment plant, recently completed, is of the activated sludge type. As the sewage reaches the plant, it passes

● **EFFLUENT from the sewage treatment plant is chlorinated before discharge to the lake behind the plant.**

through a bar screen and then through Chicago comminutors; and is prechlorinated. The treatment units consist of a 30-ft. diameter by 8.3-ft. sidewater depth primary settling tank; two aeration tanks, each 30 ft. in diameter and 11 ft. sidewater depth; a 30-ft. diameter by 9.3-ft. sidewater depth secondary settling tank; and a 40-ft. digester, 20 ft. deep. These units have Yeomans equipment. The primary and secondary clarifiers are of the Spiraflo type. Yeomans Hi-Cone mechanical aerators are used in the two aeration tanks.

Since the entire sewage treatment plant is above ground, pumping of the sewage is necessary, three Fairbanks-Morse pumps being used. The four sludge pumps were furnished by Yeomans; two are 100-gpm capacity for return sludge and two are 50-gpm units for handling raw sludge.

Expansion plans for the sewage treatment plant call for more and larger units, rectangular instead of circular, but employing the same process and utilizing the same type of equipment. There will be two 60-ft. rectangular digestion tanks with a capacity of 115,000 cu. ft.; three primary clarifiers, each 70 ft. long and 16 ft. wide; three aeration tanks, each 120 ft. long, 30 ft. wide and 13.5 ft. deep; and three final clarifiers each 55 ft. long, 25 ft. wide and 9 ft. deep. The new aeration tanks will provide 6.4 hours detention for the 16-hour average flow of sewage. Based on the 16-hour flow, the final clarifiers will have a surface loading of 1,000 gals. per sq. ft. per day. From the 1500 homes, comprising the first phase of the construction program, a flow of 500,000 gpd of sewage is expected.

Sludge from the new section of the plant will be dewatered by vacuum filters so that it can be used for fertilizer or disposed of otherwise without creating any health or odor problem. Plant effluent from the present units is chlorinated before final discharge.

The Water Plant

Carol City's water plant is dominated by a 150,000-gallon "watersphere" that looks like a giant golf ball on a tee. This was constructed by Chicago Bridge & Iron Co. As the plant is expanded, two even larger elevated tanks are planned to give a stored water supply of more than a million gallons. Water comes from two wells 65 ft. deep, supplying a maximum amount of 350 gpm. For the future, ten wells are planned to provide the estimated needed 4 mgd. The present wells reach into hard lime rock. Though test wells were sunk as deep as 100 ft., the water at the 65-ft. depth was just as satisfactory. The raw water has a hardness of 216 ppm.

The heart of the water plant is the two-story control house which provides some 1300 sq. ft. of floor space and houses a pump room, laboratory and office, chlorine room and standby generator room. A clear well of 50,000 gals. capacity is located under the building; two Fairbanks-Morse high lift pumps, with 400-gpm capacity each, lift the processed water from the clear well to the watersphere. From the elevated tank, flow is by gravity through a distribution system of J-M Transite pipe to the consumers.

Water treatment consists of four steps: The well water first enters a degasifier for the removal of carbon dioxide and other contained gases. Then it goes to a Permutit Precipitator where alum and lime are mixed with the water to soften and coagulate it and the flocculated water is settled. The third step is filtration through sand filters. As the water passes from the filters to the clear well, it is chlorinated. A Simplex rate-of-flow controller governs the rate of filtration; Wallace & Tiernan chlorinators are used. The treated water is of excellent quality and has a hardness of 88 ppm.

Sludge from the bottom of the Precipitator is siphoned off to a nearby open sludge bed. A swing sampling unit made by Permutit determines the height of sludge in the unit and a photo-electric device automatically maintains the proper sludge level for best operation.

Planned future expansion will result in doubling the size of the present control house. Four more filters and two more Precipitators will be added, giving the final plant a capacity of 4 mgd.

Ownership of the treatment plants

● **AIR VIEW shows the compact sewage treatment plant. Water plant and Watersphere are in the center background; beyond lies a portion of the 10,000-home development being built on a 2800-acre tract by the Gaines Construction Company.**

is by Carol City Utilities, Inc., whose officers are also the developers of the housing projects. Plant Superintendent is William C. Tims, who came to Carol City from Tampa where he managed the installation and operation of the sewerage system and treatment plant. Mr. Tims has been one of the outstanding sewage plant operators of Florida, twice having been awarded prizes for his work; and he has been President of the Florida Water & Sewage Works Operators' Ass'n.

Charges for Service

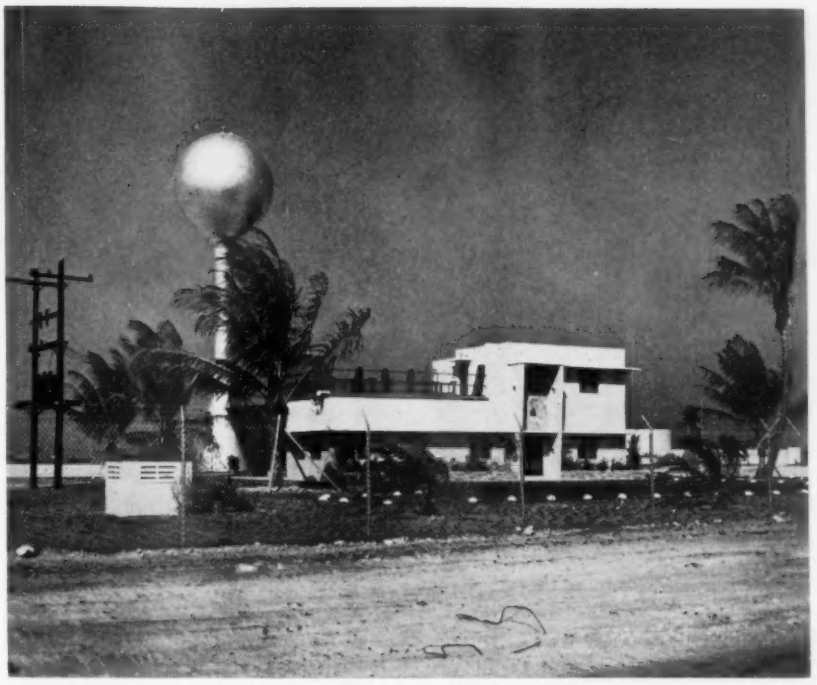
Rates at Carol City are in line with those of neighboring municipalities. Monthly sewage rates are $2.50 for one-bathroom houses and $3 for homes with two baths. Water rates have a base of $2.50 for the first 6,000 gallons, plus 40 cents per 1,000 for the next 4,000 gallons used monthly, and 30 cents a thousand over 10,000 gallons.

Studies have shown that a family of two adults and two children in the Miami area use an average of 10,000 gallons a month. This will cost $4.10 at Carol City. Rates in nearby Miami suburbs for the same amount are: $4.40 in Coral Gables; $3.50 in North Miami ;$4.25 in outer areas served by Opa-Locka; and $3.80 in North Miami Beach.

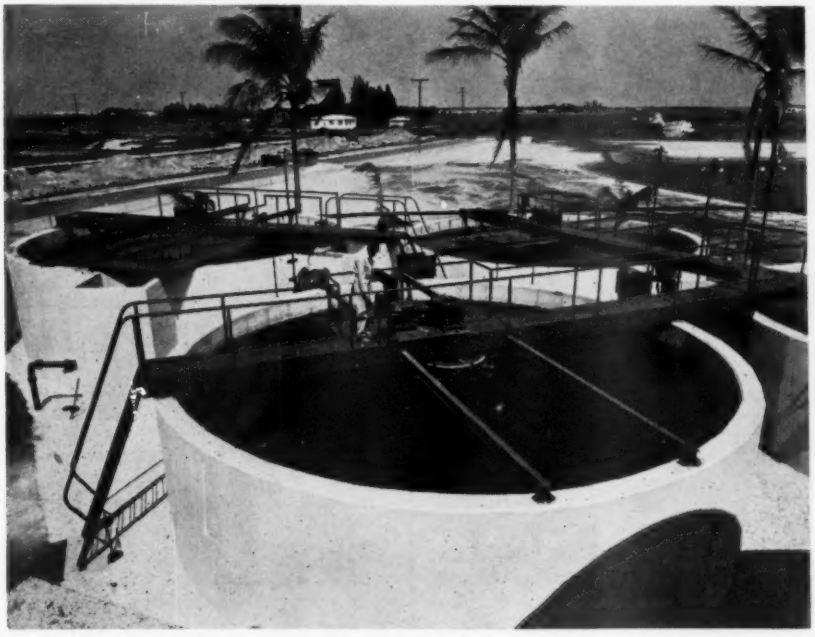
Carol City seems to have a model facility for sub-divisions under development in Florida. It was planned by engineers experienced in building water and sewage treatment plants and the problems presented by southern Florida's soil and seasonal flood conditions. Equipment installed was by the country's leading manufacturers for water and sewage treatment. An experienced, well-qualified operator was employed to supervise the operation.

As for Dade County it still has growing pains. There is no central authority with responsibility over utilities for Florida has no public utilities commission. In unincorporated areas of the county, including Carol City, county regulations require a trust agreement by the builder fixing maximum rates to be charged and posting a performance bond. If rates are not maintained or service is inadequate, the county trustee has the power to take over.

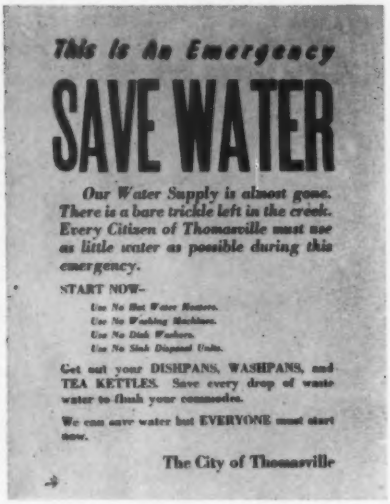
Another possible county development stems from a study recently carried out by the Metropolitan Municipal Board, an advisory body charged with future planning for Dade Co. A merger of county services under a metropolitan government is recommended. This would include county ownership of all water and sewage treatment plants. This plan has to go before the state legislature, then to the voters of the state and to metropolitan Miami. All of this will take time—several years. Although the ultimate fate of treatment plants seems to be uncertain, septic tanks are probably doomed in much of the Miami area. As health and building requirements become more stringent and taxes are increased to provide for necessary better sewage disposal, home water wells and septic tanks will probably disappear from the Miami scene . . . evidence of the progressive planning taking place in America's favorite vacationland.



● **PRESENT CAPACITY of the Carol City water treatment plant serves 1500 homes; future expansion will provide for the anticipated 10,000 families who will live in the Miami suburb. When completed two larger tanks will supplement the Watersphere, and ten wells are planned to supply an estimated 10 mgd requirement.**



● **FIRST construction phase of the sewage treatment plant provides a capacity of 500,000 gpd. Yeomans Spiraflo clarifiers and Hi-Cone mechanical aerators are used.**


This Is An Emergency
SAVE WATER
Our Water Supply is almost gone. There is a bare trickle left in the creek. Every Citizen of Thomasville must use as little water as possible during this emergency.
START NOW-
Use No Hot Water Heaters.
Use No Washing Machines.
Use No Dish Washers.
Use No Sink Disposal Units.
Get out your DISHPANS, WASHPANS, and TEA KETTLES. Save every drop of waste water to flush your commodes.
We can save water but EVERYONE must start now.
The City of Thomasville

CASE HISTORY OF A WATER SHORTAGE

J. L. MORRISON,
UNC School of Journalism,
Chapel Hill, N. C.

"THERE must be an easier way of ending a water shortage," grumbled the city fathers of Thomasville, N.C., when Hurricane Hazel burst in upon them October 15, 1954. A protracted drought—a disaster of one kind—had to be eased finally by still another disaster.

Thomasville was only one of 22 towns in the Piedmont Plateau of North Carolina falling in the water-short category the summer and fall of 1954. Because it is a compact and important industrial center, it makes a good case history subject. What happens to a town's economic and social fabric during a critical water shortage? And how do its people behave?

Says the then City Manager Everett W. Schadt, ruefully: "They get extremely emotional."

As usual, car washing and lawn watering were the first casualties. But as the summer wore on, dryer and dryer, the air conditioners followed suit and per capita water consumption had to be controlled through rationing. Finally, with no relief in sight, the Thomasville City Council set water consumption at an all-time low of 15 gallons per day per person.

City Manager Schadt, only two years on the job and laboring to update an antiquated water supply system, felt the lash of the citizens' displeasure almost as keenly as the elected representatives on the City council. All the various restrictions came from the City Council, after all, in the form of Ordinances. However these were cushioned with the sweet reason of radio announcements and other public relations devices, the people of Thomasville were good and sore.

Here was a handbill, signed "The City of Thomasville," urging one and all: "Use only a SMALL amount of water in tub. If there are many in the family go to 'spit' baths." It can be well imagined what was the reception by mothers of large families of the "spit" bath suggestion.

Housewives were especially angry during the Thomasville water crisis. It seemed that the water restrictions were aimed especially at them; that every labor-saving device in the kitchen was a target. Under the ban were hot water heaters, washing machines, dish washers and sink disposal units.

How can you enforce a water ration of 15 gallons per person per day? "You can't, really," City Manager Schadt admits. "We had to depend on the public to co-operate, mostly with good effect, but we also had to depend on volunteers to read water meters, and that's a pretty haphazard proposition at best."

At its toughest, the City Council provided no more than 30 gallons per day for special cases—for children under two years and sick people "confined to quarters by directive of a doctor."

Offenders against the 15-30 rule? They would, said the City Council, after a first warning, have their water service "cut off, disconnected, and discontinued." Such pariahs would then have to draw water from a designated public place "at the rate of three gallons per day per person."

What emergency measures had been resorted to in the meantime? The most effective help was forthcoming from tiny Kernersville, at the source of Abbott's Creek that supplies Thomasville. The Kernersville folks simply opened their fire hydrants into Abbott's Creek, from which point the water was conveyed to Thomasville's filtration plant.

Another measure of quiet desperation involved telephoning the State's Office of Civil Defense and then the Governor's office. Out of this came a sufficient length of pipe to convey water from one little nearby pond, then pump and pipe to another little Creek, then pipe and pump to the filtration plant (capacity 3 mgd for an average consumption of 1½ mgd.)

Along with the crisis, and the attendant publicity, came a detail of Army Engineers from North Carolina's Ft. Bragg. The Engineers brought with them a supply of portable field filters for treating water that could not be carried to the municipal filtration plant. The Engineers did their best, but their efforts were more dramatic in emphasizing the water crisis than anything else.

At that, the portable filters provided the small quantity of 100,000 gallons per day. It was better than nothing.

Throughout the water crisis there were two paramount dangers brought home to the people (11,000 inside the city limits and 7,000 outside) by every communications medium.

First, and easily most important, was the impending disaster that loomed in the guise of a major fire. At the crisis' worst stage, there was no more than five or six feet of water in the city's million-gallon

● **DRAMATIZING Thomasville's water shortage: Army Engineers from Fort Bragg operating portable field filters are helped by volunteers, but results were negligible.**

elevated tank. "A big fire would have wiped us out," is the way the situation is described by one of the Thomasville civic leaders, George L. Hundley, president of the State Commercial Bank.

The second danger was the spectre of mass unemployment. Thomasville is highly industrialized, largely in furniture and textiles, with the latter using great quantities of water in the process of dyeing fabrics.

"In a town like this, where there isn't anything but industry, that would be a major disaster," says Banker Hundley, "and we came awfully close. All payrolls would cease, all economic activity would be at a standstill."

Here is the situation Thomasville finds itself in. Its source of raw water, Abbott's Creek, supplies an average of 44 mgd, but there is no reservoir worthy of the name to impound a good supply of raw water. A combination of woolgathering and just plain negligence set up the situation which confronted City Manager Schadt on his taking over two years ago. Instead of a reservoir the city has a pitiful 3-ft. dam across Abbott's Creek. It impounds all of 100,000 gallons.

Of course a 2-billion gallon reservoir was projected soon after City Manager Schadt took over. It would serve Thomasville and the nearby city of Lexington too, supplying a 15-month supply of water. But this means time-consuming moves such as the floating of bond issues, obtaining land by purchase, and flooding some 700 acres of land. Target date? 1956.

Unlike many cities, Thomasville showed no population rise between 1940 and 1950. But with population stationary, industry stationary, Thomasville's water consumption rose 77 percent! That's what effect a rising standard of living has upon water consumption.

Thomasville's mill workers began by installing indoor plumbing. Then they went from well water to piped-in water. Then they began using water heaters, then clothes washers, then automatic clothes washers, dish washers, sink disposal units. A 77 percent increase in per capita water consumption in 10 years has left Thomasville with a daily consumption figure of 150 gallons per capita.

As if that were enough, domestic use—augmented by some increase in industrial use—is virtually paralleled by farm consumption of water. All over the North Carolina Piedmont area new evidences of irrigation become the rule rather than the exception—and water used for irrigation does not get back to the stream.

Moreover, Thomasville officials report, they have no way of knowing how many farmers are diverting water before it gets to Thomasville. The most dramatic form of such diversion—which would not hurt if it came at *peak* times—is reported by Banker Hundley.

Says he: "We've all heard farmers say, 'All I need is one good rain.' Well, now the farmer can *buy* that rain. He buys it from any one of a score of businessmen who sell other people's water. The typical entrepreneur has a couple of trucks, a supply of aluminum lightweight pipes and some gasoline pumps. He puts one end of his system in a stream (that may be supplying a city) and the other end in the farmer's fish pond."

City Managers of seven Piedmont cities, plagued in the past by drought, are pressing for legislative creation of a central Carolina water authority so as to take joint legal action. Chairman of the group is Banker George L. Hundley of Thomasville, who is hoping to win the co-operation of affected industries if not their official blessing.

High Rock Lake, located in Davidson and Rowan counties, is Mr. Huntley's own choice for a new water source.

Duke Power Co. has facilities located on the Yadkin River, another suggested source of water for the Piedmont Plateau of North Carolina. But this industrial heartland of the Tar Heel state, following the national pattern, must find more water. On that quest hinges the economic futures of the seven associated municipalities: Greensboro, High Point, Winston-Salem, Lexington, Thomasville, Kernersville and Burlington.

● **DAM ON Abbott's Creek was only 3 ft. high, with no adequate storage.**

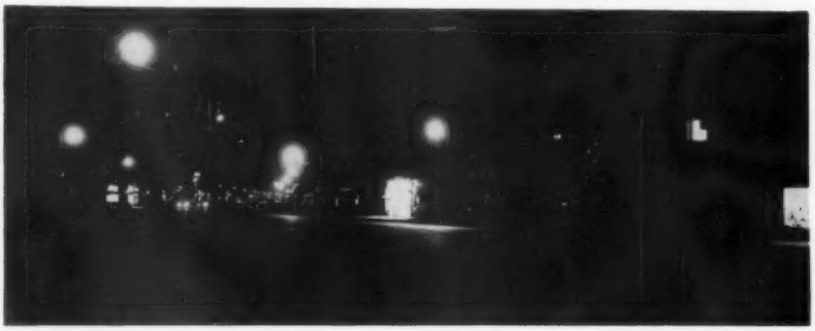
FLUORESCENT LIGHTS

BRIGHTEN RIVER ROUGE STREETS

CITIZENS of River Rouge, Michigan, are literally seeing their city in a new light now that a modern fluorescent street lighting system has been put into operation. Replacing a 30-year-old system, the new installation has more than doubled night visibility along the main thoroughfares, and has helped make River Rouge one of the best lighted cities in Michigan.

The bright new look is made possible by 199 luminaires each holding four 100-watt, cool white, rapid start fluorescent tubes encased in aluminum and plexiglass fixtures. The average output of each luminaire is 21,000 lumens. These units were manufactured by Westinghouse and General Electric.

Designed to give an air of functional beauty, the lights are mounted on 30-foot slim steel poles furnished by Kerrigan Iron Works, Inc. The poles are arranged in parallel on both sides of the street with the distance between poles being 100 feet on Coolidge and 90 feet on Jefferson. Voltage of the primary distribution system is 4,800 volts; lamp arrangement is 6.6 amp series circuit with 24 lamps per circuit. Ballasts are located in the base of each pole, where they reduce the current going up the pole and provide the proper voltage. Photoelectric cells turn on the lights whenever natural illumination falls below a certain level.



● **BEFORE light modernization autos and pedestrians near River Rouge's main intersection of Jefferson and Coolidge could be seen only in scattered pools of light.**

● **A BRIGHTER OUTLOOK after the new fluorescent street lighting installation doubled night visibility. Fixtures are tilted up to improve light at street center.**

When River Rouge put its new system into operation early this year, there were only about 4,000 fluorescent street lights being used in the United States. River Rouge's lighting system is also the first major fluorescent installation in which the fixtures are tilted upward to increase pavement brightness in the center of the street. On Coolidge (60 feet wide) the fixtures are tilted 18° and give an average on-the-pavement illumination of 1.5 foot candles. Fixtures on Jefferson (92 feet wide) are tilted 25° and provide an average illumination of 1.35 foot candles at the pavement level. This tilting arrangement redistributes about 20 percent of the light.

In addition to the improved illumination, River Rouge is now looking forward to some benefits which other cities have found go hand-in-hand with better street lighting. According to a recent report prepared by the Office of Nationwide Information in Cleveland, Ohio, many cities have discovered that good lighting stimulates community growth, inspires community spirit and pride, promotes business, cuts traffic accidents, reduces crime and actually saves more money than it costs. Municipalities that have relighted some of their streets report that modernized street lighting has reduced after-dark crimes by as much as 90 percent. More than half of the night traffic deaths in some of these cities were prevented by improved lighting. Merchants said they believed that the modern lighting will have a permanently good effect on their business.

River Rouge Councilman John R. Tattan said the new system will serve as a model to other Detroit-area communities. "The modern lamps make the old lights look like fire-flies," Tattan said.

● RUBBER-tired roller, left, working on asphaltic concrete surface course which is tapered down to old surface.

Rubber-Tired Rollers

Help in Resurfacing Program

A CONSIDERABLE program of resurfacing over street car tracks is being carried out in Minneapolis, Minn. Most of the existing pavement in the track area is of cobble, and this is quite rough. Typical procedure, which includes tapering the final wearing course to meet the existing asphaltic concrete surfacing, involves the following steps:

A tack coat of tar is applied to the existing surface and an asphaltic concrete binder and leveling course, with an average thickness of 1½ in. is laid. On top of this is placed a 1½-inch average thickness wearing course. On the extreme edges, where the new and old surfaces meet, an asphaltic cement tack coat 1 ft. wide is applied hot with a squeegee. A seal coat is placed over the entire street surface, new and old alike. All asphaltic mixtures are applied with a bituminous paver. A typical section of the project on Nicollet Ave. involved laying a binder-leveling course about 20 ft. wide, centered on the street car tracks, and a wearing course 30 ft. wide, feathered into the old pavement at the edges.

Since the surface of the old block pavement is usually quite rough and thorough compaction is necessary, the following rolling procedures are standard: The asphaltic concrete is initially compacted with a steel-wheel roller; a rubber-tired roller follows closely to knead the entire surface into place and to compact the material into the interstices of the old blocks and around the tracks. Final rolling is done with a steel-wheel roller. It has been found advantageous to use a self-propelled rubber-tired roller, not only because it is more convenient in city traffic conditions, as compared to a towed roller, but also because it can follow more closely after the initial rolling by the steel-wheel roller. The photos herewith show a Tampo roller at work on this Minneapolis resurfacing program. This roller has also been found advantageous for compacting soil base courses and for rolling rock chips into asphaltic seal coats.

The information in this article is from the office of Hugo G. Erickson, City Engineer of Minneapolis, through the kindness of Gordon E. Bodien, Paving Engineer, and Elmer H. Lund, Street Maintenance Superintendent.

● CLOSE-UP of rubber-tired roller from rear, showing feather-edging new pavement course into the existing surface.

● AFTER initial compacting by steel-wheel roller, the rubber-tired self-propelled roller takes over compacting work.

S. JAMES DUNCAN,
Manager of Highway Sales,
Industrial Div., International Salt Co.

WINTER

Rock Salt Keeps Pavements Bare

THE USE OF rock salt for the winter maintenance of bare pavements has been growing in importance for the last three decades. Today, a brief look at some of the experiences of major user groups points up the vital part rock salt is playing during the winter months and the many economies that it is letting us realize.

Added emphasis is given to the use of rock salt for bare pavement maintenance, for instance, by the increased revenue accruing to several toll roads as a direct result of using rock salt. The New York Thruway, the Maine Turnpike, the Garden State Parkway and the New Jersey Turnpike are a few of the revenue - producing installations which have found rock salt to be an effective means of guaranteeing continued revenue during extreme weather conditions.

The states in the Middle West which have been using straight rock salt for a period of years know that their bare pavement policies have resulted in enough increased tax receipts during the winter months to more than pay for their entire winter maintenance program. When a community or an area has become accustomed to and become assured that pavements will be safe for travel at all times, there is no hesistancy on either the truckers' or the pleasure drivers' parts to start out for any point at any time.

Modern trucks and roads have extended today's production and life lines far beyond the plant fence and the city limits. A breakdown in today's supply lines due to snow and ice is as serious as a breakdown within our plants themselves, or a short-lived epidemic or strike which paralyzes an essential producing group. Today, more than ever before, rock salt as a means of keeping our winter pavements bare and safe is receiving top priority.

Detroit is typical of many modern cities which are fully aware of the advantages of maintaining bare pavements with straight rock salt. Economies that go to the very heart of public works organizations are the reduction in overtime labor, the cutting of street sweeping and cleaning of sewers and manholes. But more important than this, these cities recognize the value to the community in the reduction of payroll loss due to absenteeism and lateness which rapidly mounts into millions of dollars.

● **SNOW persists on pavement that was plowed but not treated with salt.**

The savings due to bare pavement maintenance resulting from the use of straight rock salt in the City of Detroit is estimated to amount to about $75 million a year. This includes, of course, the reduction in time required for trucks to travel definite distances, as well as the elimination of delays in going to and from work on the part of the labor force. This figure cannot reflect the savings in mental anguish suffered by the driver of a vehicle when he feels that he has no control over his vehicle. An unsafe highway, I believe, is one of our generations best ulcer builders.

The use of straight rock salt also reduces property damage and physical disability. The reduction of winter accidents, even minor ones, has been very evident to police accident record bureaus. Records show a definite decrease in accident rates following the application of rock salt. For instance, the failure to apply rock salt within the first hour of a storm might result in 750 accident calls. In the next hour, after salting and even during heavier traffic, the accident rate will likely drop to 200 calls per hour. A reduction to one-third the number of accident calls, even during periods of continuing storm, is quite common after rock salt has been spread. Because insurance rates are based on accident experience, there is every reason to expect that a community using straight rock salt for bare pavements should have lower insurance rates for vehicle collision and liability coverage.

On Rural Highways

The economy of using rock salt on rural mileage is emphasized by the speed with which long stretches of highway can be covered. Greater speed is realized because more mileage can be covered with a given truck of rock salt than if the same truck were spreading abrasives. It requires only 500 pounds of rock salt normally to make a mile of 20-foot wide highway a safe place for travel.

It is customary for a highway organization to send out small task units such as pickup trucks with bags of rock salt and spreaders. These units speedily protect stop signs, railroad crossings, bad intersections, hills and curves. Increasingly common is the practice of following up these small units with larger ones which cover the entire length of road. This is essential to any modern winter road program, for adequate protection can no longer be given by covering only such areas as hills and curves. Accident records prove that the

MAINTENANCE:

straight-away is as great a hazard as any hill or curve and must be as well protected.

More economical use of rock salt has resulted from using new mechanical spreaders now on the market. These units eliminate the need for a man on the back of the truck, and one man operation is possible with these units, except for the safety factor given by two men riding in a cab. These spreaders have permitted reduced equipment rental costs, hours of labor and quantities of salt spread. Rock salt has suffered more in the eyes of the public from its abuse than from its use. More than adequate amounts of salt are often spread and the resulting discoloration is objectionable to the public. Though the harm done by rock salt has been greatly overemphasized, it is to the advantage of public officials to use only the minimum possible quantity and this can best be done by the use of the most improved types of mechanical spreaders.

Bulk storage of rock salt has become a very important source of saving to organizations which have made proper use of it. With the increased use of rock salt for ice control, it is often not possible for the suppliers adequately to meet the market demands during the extreme emergencies of storm periods. Transportation facilities may also be tied up. Though the rock salt mines have provided large stockpiles at their plants, the only salt that is of real value to the user is the salt in his yard. For this reason, many communities are building storage piles during the summer and early fall months.

The State of Ohio starts to ship its winter salt during the month of May and has built covered storage for great quantities of rock salt. Other states are moving towards early shipments and there is every indication that the continuing trend is toward earlier shipments.

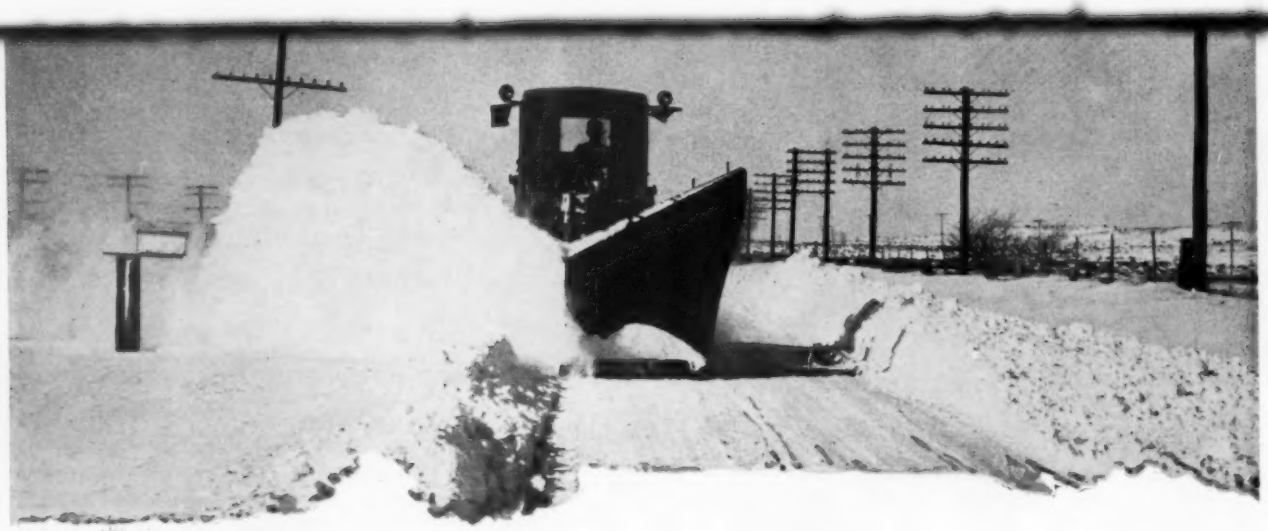
The majority of users are building storage piles on paved areas so that the loading equipment can get to the piles at all times. The rock salt is stored in the open and is covered with about six inches of sand. Of course, if this is a clean washed sand, it does not absorb the quantity of water which would be taken up by a tighter sand. The results are not as satisfactory as with unwashed sand. A cap of three to six inches of unwashed sand will keep a rock salt pile in very satisfactory condition.

The City of Detroit tries to keep approximately 15,000 tons of rock salt in storage at the various yards. The city has found that the delay resulting from waiting for shipment during emergency periods has resulted in much greater costs than the storage costs. Though Detroit has stored in open areas and furnished no cover over the piles, the results in loading and removal have been excellent. Cleveland, which also orders early and stores in unprotected open piles, has had a similar success story.

It has become increasingly evident as more storage has taken place that another piece of equipment is essential to the effective use of rock salt in winter maintenance. This is some type of front end loader which can take rock salt from the pile and load it into trucks. But what is needed now, in order really to facilitate winter programs, is a well-designed overhead bin capable of holding approximately 500 tons of rock-salt—one that can be installed at a low cost. This bin would be very easily designed if all cities had a side hill operations so that rock salt could be dumped from delivery trucks or trains at a higher elevation and removed by spreading trucks at a lower elevation.

In conclusion, the safety resulting from bare pavement maintenance would justify the expenditure of greater percentages of the highway budget. The proper use of rock salt, however, has resulted in economies in so many directions that every form of government—city, township, county, state and toll revenue authority—is warranted in making a thorough investigation and trial of this way of maintaining open and safe winter roads.

● **PROGRESSIVE MELTING** is shown in these pictures, taken at intervals after application of rock salt.



KEEPING Kansas Highways Free of Snow

WILLIAM J. LUTZ,
Director of Public Relations
Kansas State Highway Commission

KEEPING KANSAS' 9,700 miles of state highways clear during the winter months is one of the costliest and most arduous jobs of the State Highway Commission. Probably one of the main reasons for the tremendous task the highway department faces each winter is the uncertainty of Ole' man Winter himself. Many freakish snow and ice storms have occurred the past few years to tax the efforts of our maintenance men.

The northwestern part of the state is generally considered to be the section which will receive the most severe snow fall. However, this theory was knocked into a "cocked" hat in 1952 and again in 1954. In 1952, one of the worst snow storms in several years struck the state, with the hardest hit section being the central area from Oklahoma to Nebraska. In 1954, the southeastern part of the state, normally the section of Kansas that receives more sleet and ice storms, had a snow storm that measured up to 26 inches in some places.

Storms such as these not only force additional long hours of work on maintenance crews of the particular highway divisions, but it means the transfer of men and equipment from other divisions.

Probably the greatest obstacle confronted by the road crews in clearing the way after one of these heavy snows is caused by motorists themselves. Particularly was this true of the 1952 storm. Despite warnings about blocked highways many motorists continued on their journey only to be caught in impassable snow drifts. Many had to abandon their vehicles and seek shelter at farm homes. The abandoned cars, some completely covered by snow, often caused maintenance equipment to run off the main roadway to avoid hitting a vehicle.

Neither the 1952 nor 1954 snow falls, however, caused as much trouble from the standpoint of operating snow plows as did the one which hit the northwestern section of the state in November, 1948. This was a wet heavy snow driven by winds up to 70 miles per hour. Due to the high winds, the snow drifted in immediately behind plow equipment and the sifting snow caused motors to short out. The snow packed so hard that rotary plows were unable to cut through and bulldozers were used to loosen up the drifts.

When the record breaking floods hit the state in 1951, many a story was told about an old Indian who predicted that flood waters would

● **LESS THAN king-size drifts can be moved with the smaller V-type plow mounted on a motor-grader. In case of light snowfalls, the regular grader blade is used.**

hit Kansas that year. However, an old Indian has yet to be found who can predict the type of snows we will have. So in the absence of such forecasts, the highway department can only make normal preparations for the winter months.

Normal preparations consist of erecting approximately 500 miles of snow fence, stockpiling salt treated sand and rock, and getting all snow removal machinery in good working order.

The snow fence is erected in all areas of the state, particularly along sections of highways that are susceptible to drifting. The prevailing winds in Kansas are from the north and northwest so most of the fence is placed to protect east-west highways. To speed the erection of the snow fence, the posts are driven into the ground by miniature power-driven pile drivers which are mounted on the back of small tractors.

Sleet and Ice

The problem of sleet and freezing rain is, at times, as troublesome as heavy snow. As stated before, these conditions are more frequent in the southeastern and eastern part of the state, particularly the former. In both of these sections of the state one will find many steep grades on the highways. To combat the hazards resulting from ice, the highway department has over 30 ice-control spreaders, some for aggregate and some for salt only. Along sections of highways where there are steep grades, the department places small stockpiles of salt-treated sand. Motorists encountering difficulty on a slippery grade can obtain enough sand from these stockpiles to enable him to get traction.

As for major snow removal equipment, the highway department has two rotary plows, 165 one-way plows and 404 V-plows. The one-way units can be hooked to light trucks and the V-shaped units are attached to heavy trucks or motor graders. These plows are distributed throughout the entire state although the two rotary units are kept at Norton, division headquarters for northwest Kansas. This snow moving equipment is considered sufficient to take care of prevailing snow removal requirements. Only in extreme cases, such as mentioned previously, does the highway maintenance department feel that our present facilities are short. When these extreme cases occur, some equipment such as motor graders and bulldozers are rented.

A better understanding of how maintenance operations are carried out by the Kansas State Highway Commission may be obtained by briefly outlining its organization as regards the maintenance department. Heading the overall maintenance department is the maintenance engineer and his assistant whose office is in the headquarters building at Topeka. The state is divided into six divisions, each division with its own headquarters office. Each division is subdivided into four to five districts, each having its own district office. At present, there are twenty-seven districts. Heading the personnel in each division is a division engineer, two assistants, construction superintendent, office engineer, mechanics, clerks and other personnel. Heading each district is a district supervisor along with his clerks, mechanics and maintenancemen. Maintenance crews throughout each district are assigned certain sections of highway to maintain. When emergencies arise in any one particular district, the district supervisor may request or the division maintenance engineer may assign personnel from other districts.

Two-Way Radio Helps

One phase of our overall maintenance operation which has not been mentioned, and one that probably is as important as any, is the highway radio network. During many of our worst snow and ice storms, radio means of communication has been the only contact with division and district offices. Each of the six division headquarters offices as well as the twenty-seven district offices are equipped with transmitters, some 250-watt and some as high as 3,000-watt. Portable radio units are installed in cars driven by the division engineers, the assistant engineers, construction superintendents, mechanics, district supervisors and some foremen. These enable the headquarters men to keep in close contact with the district and mobile units, as well as the mobile units with their operations base. By communicating with each other it is possible for equipment to be transferred from one place to another while in the field.

One of the chief worries of the Commission's maintenance department during the winter months is the breakup that accompanies the freezing and thawing process.

Yes, the job of keeping the state's highways clear during the winter is a big one and the bill comes high. But that is nothing when added up against the loss of life, loss of property or paralyzed business resulting from blocked or hazardous roads.

● **BIG V-TYPE plow mounted on a motor grader is used for heavy going. This was 1952 storm, pictured near Dodge City.**

● **BULLDOZER is not standard snow-moving equipment, but is used to loosen heavy, ice-packed snow drifts that occur.**

WINTER MEANS PLOWING, SANDING and BLIZZARD FIGHTING

PAT THOMSON,
County Engineer,
Douglas County, Wash.

TO THE layman, the term maintenance usually means blading a road, weeding the shoulders, or painting a bridge. Seldom, if ever, does it enter his mind that snow removal—plowing, sanding, blizzard fighting—is also regular maintenance.

And a very expensive maintenance! During one 62-day period, a period in which the temperature day or night was never above 10 degrees below zero, the snowplowing costs to Douglas County, Washington ranged over $120,000. Because of the unpredictable character of our winter maintenance, sufficient funds to cover maximum conditions must be retained. Otherwise, the county road department could possibly find itself financially buried in the midst of a big snow blow.

Douglas County, Washington, lies in an regrettable topographic position snowwise. We commence at the foothills of the Cascade Mountain range and run eastward across the Big Bend plateau. This proximity to the mountains brings us a heavy snowfall, up to 43 inches on the level by direct measurement. Although the Big Bend is a rolling agricultural region, we also have height, elevations ranging from the 600-foot Columbia River level through the 2800-foot plateau region to the 5400-foot breaks of Badger Mountain. Unfortunately, this elevation does not include forests or mountain ranges. Consequently, we have wind—sometimes days and days of it—sweeping across the plateau in 30 to 50-mile an hour gusts. These blasts, coupled with four feet of feathery snow, level off all road cuts, leaving up to 16-foot drifts. Add temperatures dropping to 32 degrees below zero, and brother, you've had it. This often means six to seven hundred miles of road closed overnight. And this with drifts frozen so hard that a D7 Caterpillar tractor will walk over them not breaking the crust.

Douglas County is actually broken into two distinct economies. The river area, containing the bulk of the population, is a highly developed fruit and residential region. It is the fourth fastest growing region of the State of Washington today. This belt, approximately three by twenty-five miles, is characterized by many short, steep bituminous surfaced streets that intersect state highways or other county arterials. These streets have a heavy early morning labor traffic ranging up to 1800 vehicles per day.

Only Light Snow

This area is covered from our East Wenatchee shop under Maintenance Supervisor Myron Gormley. Snow in this area is comparatively light, generally averaging about a foot in depth. The winter problem then resolves into one of quick removal of snow followed by immediate sanding. And to prevent serious accidents, this sanding has to be done before the morning traffic starts moving.

Consequently, in this area we operate a night crew most of the winter if conditions warrant it. General policy is to go through quickly, sanding all stop intersections for a reasonable distance. Then, with time permitting, we backtrack to the second dangerous locations, catching high spots—the steeper hills, and the busiest intersections again.

For sanding, we use a sharp, clean granite sand produced for us at a commercial plant for 35 cents per cubic yard. More sand is used than feasible to contain in bunkers, so we stockpile in the shop yard, using a mechanical loader for later pickup. Since this sand is washed and contains few fines, very little interior wetting, freezing, or lumpy adherence occurs. Sanding, at the present, is done with the two-wheeled tailgate type of sander, with hopes of replacing these with the automatic bed side delivery type.

Plowing is done in this area with F8 Ford dump trucks mounted with 10-12 foot Good Roads or Baker angle blade pushplows. Plows are equipped with electric hoists, allowing one man to operate the machine easily and quickly alone, a necessity because of the many intersections.

A freeze and thaw year in this area really ruins us. Every hill becomes a glaring glaze of sheet ice. But it is the kids' delight, for on the short steep slopes a sled will really travel. Fortunately, we have had no serious accidents, but the phone crying, "Children on the hills", really makes us shiver.

Endless Drifts

Of our 1670 miles of road system, we plow 1200 miles, with almost 500 miles of this trunk mileage —mail and school bus routes. And the plateau agricultural area is the direct reverse of the river area. Here the population is widespread on large wheat holdings, about 6000 people in 700,000 acres. Here we have endless hours of slogging through endless miles of seemingly endless drifts.

Snowplowing here is handled through Maintenance Supervisors Roy Ogle, Waterville, and Loys Weir, Mansfield. The general policy is to plow school and mail routes first. These coincide with the primary road system. We then plow the other mileages in direct order of importance. First light snows are handled with push plows. And we have found that running two units together makes a speedy, efficient operation, for two passes clears the

traffic lanes. With all roads open, single units are sent over the roads to get the snow back as far as possible.

The heavy snows and wind blows are handled with the large Vee and wing plow rigs, Walters and FWD trucks, and Caterpillar and Galion patrols. Our main objective, then, is to get everyone out, opening up all routes to one way traffic. Widening is completed when time permits.

After a heavy blow, the phone jangles almost constantly. And we can almost predict two things—some hysterical young lady is about to have a child, or someone is out of fuel oil, freezing to death.

Plowing snow in this area is hard, desperate work; but operators of the 15-ton monsters drive in their shirt-sleeves, perspiration dripping from their faces. They work long, often heart-breaking hours in the face of a gale, and do not appreciate emergency calls that are not emergencies. In this respect, we have two great headaches. Those people who phone in, feigning illness, only to meet the weary drivers with a grin and the consolation of a hot cup of coffee. To counteract this, we have insisted upon a call from the local doctor confirming illness. Next, we have those people who have lived in the region thirty years, yet never expect a blow. And consequently, they are always out of supplies.

Plowing a heavy drifted region is torturous labor. In one instance, a bachelor farmer phoned in a lack of food. Slamming and banging for five hours finally opened the drifts blocking his road. He returned with his supplies while the crew was still widening the road. And he had, to tide him over another storm, one loaf of bread and a case of beer! Is it any wonder that snow plow drivers wake up screaming.

Drivers, because of their familiarity with heavy rigs, often believe them infallible. They sometimes don't carry sufficient clothing and a complete breakdown, in pre-radio days, left them stranded too. In one unfortunate incident only sheer luck prevented the loss of a man.

Now all of our plows are equipped with two-way radio communication. This is an open repeater Motorola system operating on a frequency of 154.79 mc. And it has proven invaluable. So much so, that a major station breakdown is almost like losing your voice so dependent are we upon the immediate service.

We attempt, in so far as possible, to operate our plows on a flexible

(*Continued on page* 165)

● **SERVICE:** Roads have been plowed to bring a doctor and a nurse to a farm home.

● **FIRST** snows are winged back as far as possible because more is sure to come.

● **TRACTOR** and bulldozer clear roads so essential utilities are maintained.

TAMPA Expands its Sewerage

IMPROVEMENT and expansion of sewage handling facilities by Tampa, Fla., has cost $22,000,000 over a three year period. The program started in 1952 when, at a cost of $12,000,000, the city virtually rebuilt its overloaded, out-moded system, replacing a 35-year-old disposal plant with a modern 36-mgd. primary treatment plant, constructing six new pumping stations, rehabilitating four existing pumping stations, and constructing 5 new air-ejector stations. At that time, a disjointed network of isolated sewers most of which discharged directly into the waters in and around the city, was transformed into a modern "master plan" system and serious water pollution in waters around the city was all but eliminated.

A year later, however, the city was faced with the necessity of expanding its system for a second time. Approximately 40 square miles of suburban territory were annexed, including the communities of Sulphur Springs and Palma Ceia, and the city's total population was increased 78 percent, from 125,000 to 216,000. This gave Tampa's Bureau of Sanitary Sewers an opportunity to continue its efforts to reduce bacterial count in the Hillsboro River, which winds through the center of the city and in Tampa Bay, Old Tampa Bay, McKay Bay and Hillsboro Bay, which surround it on three sides. This job entailed the expenditure of another $10,000,000.

New Pumping Stations

The sewerage systems serving the annexed communities were even more outmoded and overloaded than Tampa's original system, most facilities dating back to World War I days. There were a few old disposal plants, but most raw sewage was discharged directly into the river or bay without treatment. To eliminate this practice, the city is constructing 18 new pumping and ejector stations, ranging in capacity up to 14 mgd. and is laying 175 miles of new sewer lines, 8 to 48 inches in diameter. The plan calls for the system in each new community to be tied in with Tampa's new treatment plant and for the elimination of all remaining discharge of raw sewage into the surrounding waters. The 36-mgd. disposal plant has more than enough reserve capacity to handle the anticipated flow increase of 8 to 10 mgd. The current average is 15 mgd. A tentative completion date for this second phase of the city's expansion program has been set for 1957.

The work completed to date has already resulted in remarkable improvement in quality in the waters surrounding "old" and "new" Tampa. Before Phase One was completed, the bacterial counts in the Hillsboro River ran as high as 160 million per 100 millileters of water. Today, at the same point, the count has been reduced to a low of 350. The average for the entire river is now computed at or below 1,000, and the average in the four bays is reported to be at or below 3,300 per 100 millileters. When the entire program is completed and all discharge of raw sewage is stopped, it is expected that the count everywhere will be reduced to bathing beach standards.

Partly responsible for this success is close supervision of industrial sewage, carried on by Tampa's industrial waste engineering staff. Tampa has diversified industry, including large citrus fruit, shrimp, crab meat and bean packing plants, breweries, cigar makers and sausage manufacturers. Some of the packing plants gave trouble in the past, but frequent spot checks by the engineering staff have virtually eliminated the problem. At present, the city's raw sewage averages about 182 ppm. of suspended solids, of which 63.1 percent are removed;

● **MODERN PRIMARY TREATMENT PLANT at Tampa, Florida, constructed as part of a $12 million sewerage program started in 1952, currently treats 15 mgd, has a capacity of 36 mgd. When the city's present $10 million expansion program is completed an additional flow of from 8 to 10 mgd is anticipated. Shown here are the administration building and treatment units.**

System a Second Time in Three Years

and 182 ppm. of BOD, of which 35.5 percent is removed.

The Treatment Plant

Chief responsibility for the success of Tampa's anti-water-pollution effort rests with the city's new 36-mgd. primary treatment plant at Hookers Point. This plant is fed both by gravity and by a 54-in. force main from the system's principal pumping station, located on Krause Street. The force main presently feeds an average of 8 mgd. into the plant, the flow bypassing the plant's pumping station and going directly to the grit separation building.

The gravity main is also 54 inches in diameter, delivering a current average of 7 mgd to a sump at the plant's pumping station. This sump is quartered off to provide individual suction bays for four Fairbanks-Morse vertical close-coupled angleflow pumps and is equipped with a mechanically-cleaned screen with 1½-in. bar spacings. Two of the four F-M pumps are 20-in. units, driven by variable speed, 75-hp., F-M slip ring motors with maximum speed of 495 rpm. They are rated at 11,100 gpm. at a tdh of 20 ft. The other two pumps are 16-in. units and are driven by constant speed, 30-hp., 585-rpm., F-M motors. Each is rated at 5750 gpm. at a head of 18 feet. The flow from these pumps joins the flow from the Krause Street station at the grit chambers, where Chain Belt triturators grind the screenings from the Link-Belt screens and return the pulverized screenings to the main flow. Sand and grit are removed by Jeffrey grit collectors and subsequently buried.

From the grit building, the sewage flows to the plant's four settling tanks, only two of which are currently in use. The detention time in these tanks, which measure 170 ft. by 40 ft., with an 11-ft. sidewater depth, is now 2.3 hours. Sludge from the settling tanks is collected by motor-driven sludge collectors and is withdrawn by gravity to a visual sludge pit. From here it is pumped through PFT heat exchangers, which raise its temperature to 90° thence to three 833,-000-gal. digesters, equipped with PFT floating covers. The digesters produce an average of 150,000 cu. ft. of gas per day, of which about 70,000 cu. ft. is consumed by the plant's 345-hp. sewage gas and 300-hp. dual fuel engines. Together these engines produce about 2,000 kw. hrs. of electricity per day, enough for all lighting and other power purposes in the plant.

After digestion, sludge is pumped to 28 sludge drying beds, each 50 ft. X 125 ft., with individual capacities of 35,000 gallons. It generally requires about 10 days for eight inches of sludge in these beds to dry down to 1½ or 2 inches, at which time it is removed and sold for use as fertilizer.

The effluent from the settling tanks is passed through fine screens and then chlorinated. It is discharged through a 72-in. outfall line which extends 3750 feet into the bay, with discharge on the bottom 35 feet below the surface. At this point there is an unlimited dilution factor, due to tidal action, winds, surface tension and temperature. Maximum boil from the discharge line is never more than 50 feet in diameter.

Semi-weekly MPN bacterial tests are made at eight points within a half mile of this outfall. As previously noted, the results have been outstanding.

Pumping Station Data

All of the six pumping stations constructed as part of the first expansion program, including the one at the treatment plant, are equipped with Fairbanks-Morse sewage pumps. The remaining 5 stations are of the air-ejector type and are automatically operated. As part of the same program, four of the system's original pumping stations were rehabilitated.

The Krause Street station, rated at 121 mgd., is the largest in the system and discharges directly through a 54-in. force main to the plant. It is of concrete block construction and is equipped with four Fairbanks - Morse vertical, split-case, angleflow pumps. Two of these pumps are 24-in units, rated at 22 mgd. at a head of 27 ft. and are driven by 105-hp., 434-rpm. F-M motors. The third is a 30-in. unit, rated at 35 mgd. at a head of 45 ft. and driven by a 300-hp., 390-rpm. F-M motor. The fourth angle-flow pump is the largest, a 36-in. unit rated at 42 mgd. at a 45-ft. head; it is driven by a 300-hp., 349-rpm. Fairbanks-Morse motor.

In common with the pumping station at the plant, the Krause Street station is not equipped with automatic pump controls, each unit being started and stopped by conventional manual controls. The pumps are protected by a manually cleaned trash rack, with 2½-in. spacings and take suction from a quartered-off sump.

The remaining four pumping stations constructed as part of this program are designed as private residences, blending unobtrusively into the surrounding neighborhood. The deception is so carefully carried out, with closely cropped lawns, hedges, and all the trimmings, that none but the closest neighbors know who truly "lives" there.

These four stations, known as the Louisiana, Perry Avenue, 12th Street and Branch Avenue Stations, are equipped with a total of 13 F-M pumps, ranging in capacity from 300 gpm. to 8,000 gpm. at heads of from 8 feet to 29 feet. Each of the 13 pumps is put on the line and stopped by means of automatic mercury - switch controls. Six are equipped with airfoil design, fully enclosed impellers, which enable them to handle fibrous materials without danger of clogging; the 4-inch pumps equipped with these specially designed impellers can pass spheres of 3-in. diameter.

The Branch Avenue station has three pumping units. Two are 5-in., F-M vertical sewage pumps, rated at 1050 gpm. against a total head of 29 feet and driven by 15-hp. motors. The third is a 4-in. unit of the same type, rated at 600 gpm. at a head of 25 feet, and driven by a 7½-hp. motor.

A full-time operator is in attendance at the treatment plant and Krause Street pumping stations at all hours of the day, while a roving attendant, with headquarters at the Louisiana Avenue station, makes

periodic checks at all automatically controlled stations.

Three of the four rehabilitated stations are located on Davis Island across the main ship channel from the Hookers Point treatment plant in Hillsboro Bay. Known as the Davis No. 1, Davis No. 2 and Davis No. 3 stations, they were stripped of obsolete equipment and six Fairbanks-Morse pumps were installed. These pumps range in capacity from 700 gpm. to 1000 gpm. and operate against total heads of from 17 feet to 30 feet. Of unusual interest is the Davis No. 3 station, which is underground and is of concrete construction. All three pumping stations on Davis Island are equipped with automatic pump controls.

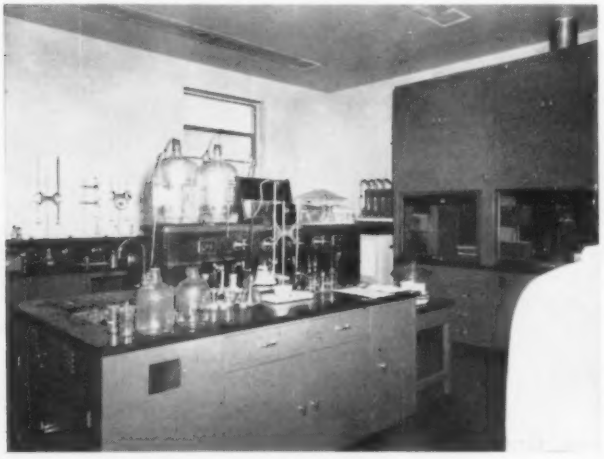
The 23 new stations were constructed in the Seminole Heights, Ybor City and West Tampa sections of the city, along the Hillsboro River, where the heaviest population is centered. Unlike much of central and southern Florida, the terrain around Tampa slopes sufficiently to permit adequate gravity flow and there is no flood problem. No storm water is carried in the sanitary system and infiltration is very low.

The 174 miles of new sewage line and 18 new stations are being constructed in the newly incorporated suburban areas, replacing outmoded facilities.

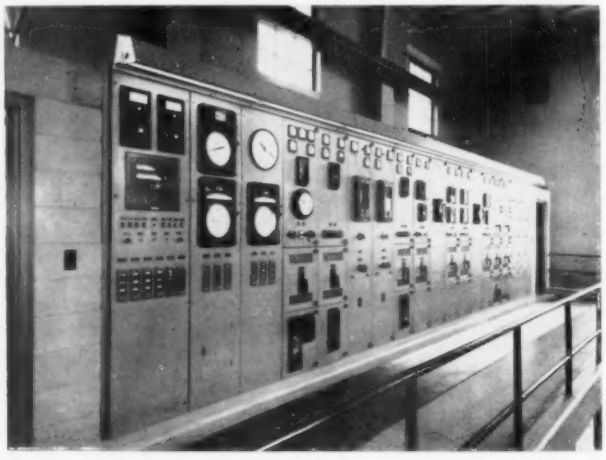
One of the new communities annexed is Drew Field, west of the city, where a residential and industrial center grew up around a World War II Army Air Force base. To serve a population which was once as high as 55,000, the Army built, an extensive sewerage system, including four pumping stations and a 2.5 mgd trickling filter treatment plant in 1942. When the base was vacated in 1946, these facilities were turned over to Tampa and are still in operation. Current plans call for the abandonment of the treatment plant and two of the four pumping stations. The system will be tied in with the city's master plan and all raw sewage will be pumped for treatment to the new plant on Hooker's Point. The four pumping stations are equipped with a total of 11 Fairbanks-Morse submerged sewage pumps, ranging in capacity from 75 gpm. to 750 gpm. and driven by F-M motors from 1½-hp. to 20-hp.

Other newly incorporated communities which will benefit from the current expansion program include Sulphur Springs, Palma Ceia, Hyde Park, Ballast Point, and East Tampa.

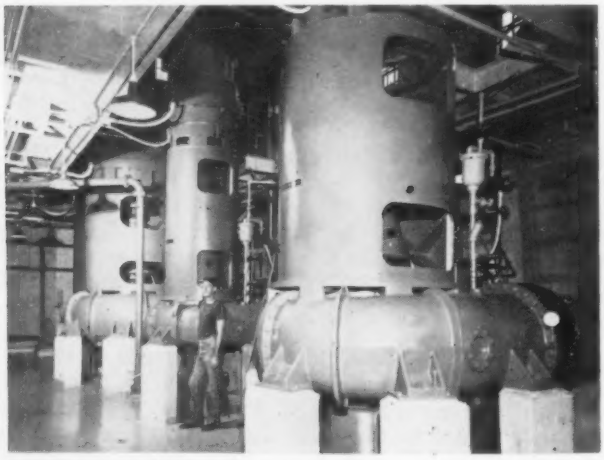
Design of the sewerage system and supervision of construction was by Greeley and Hansen, Consulting Engineers, Chicago, Illinois. City officials active in initiating and carrying out the project include Mayor Curtis Hixon and the Board of Representatives; Roy K. Van Camp, City Engineer and Superintendent of the Department of Public Works; and B. M. Duncan, Superintendent of the Bureau of Sanitary Sewers of the City.



● **BACTERIOLOGICAL** and chemical laboratory which serves the plant is reputed to be one of best equipped in country.

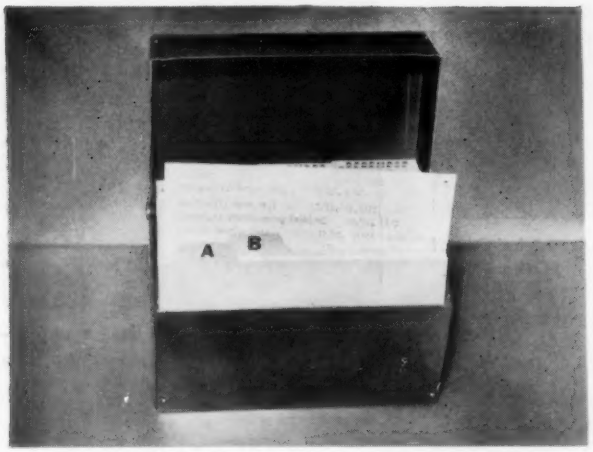


● **POWER** from two engine-driven generators is controlled from this Westinghouse switchboard and pump control panel.

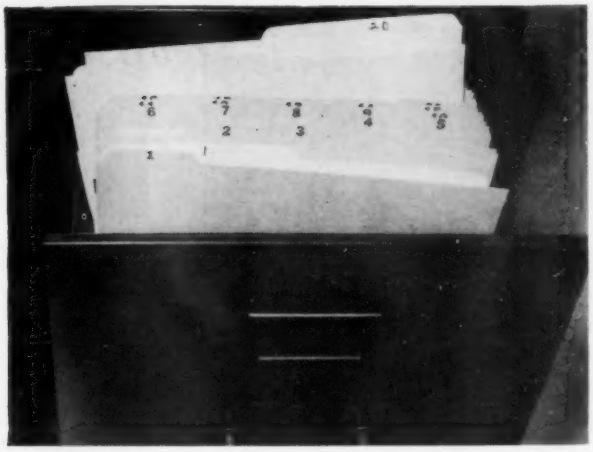


● **FOUR** big Fairbanks-Morse angleflow pumps at Krause St. station have total capacity of 121 mgd at 27 to 45-ft. heads.

● **INTERIOR** of treatment plant pumping station showing four F-M close-coupled angleflow pumps and F-M motors.



● **INDEX cards record contents of the larger tickler file.**



● **DAILY reminders keep the administrator on schedule.**

SETTING UP A TICKLER FILE

JEPTHA J. CARRELL,

City Manager,

Xenia, Ohio

THERE are few things more essential in the field of municipal management than the fulfillment promises made to the citizen. Some of the promises will naturally concern matters of sweeping importance. The average man, however, judges his city or village government by a modest yard-stick:—was his complaint about a sewer given prompt attention; or did the City remember to patch his sidewalk after it replaced his curb.

Human recollection being the woefully fallible thing it is, the only sensible answer is a system rather than a hope. Because of the great importance of such a system, one would think that all municipal officials would know and use it, but my experience has been that very few know about a tickler file and fewer use it. Since I learned about it only a couple of years ago, I feel a close kinship to those who operate in a darkness characterized by forgotten tasks.

The system that I use is not original with me and I am sure is used by many others. It is made up of two parts. The first part consists of a small section of a regular file drawer in which are placed numbered cards for each day of the month. Behind each card is a manila folder which holds all the items for a particular day of any month, of any year. For example, in the folder behind the numeral "20" are placed all items which are to be reviewed on the twentieth of January, twentieth of February, twentieth of March, etc., through the twentieth of December. If there is a tickler for the twentieth of January 1967 that also goes in the folder marked "20".

The second part of the system consists of a 3 x 5-in. card file. This file is arranged alphabetically. There can be any number of cards filed behind any single alphabet letter. The number will depend on the number of items that it is found necessary to keep in the tickler or "Bring-Up" File. This 3 x 5 card file is maintained for the purpose of indexing what is in the regular file drawer file. In other words, if it is necessary to find any particular paper, it can be found by using the index rather than thumbing through all of the papers in the large file drawer.

For purposes of illustration, let us trace through one single item. Suppose that a citizen named Smith has been promised that his curb and gutter will be repaired at the beginning of the next construction season. At the time of the promise a memorandum is made up, indicating the substance of the promise, and this is sent to the secretary with a notation in the upper right hand corner "T" (for tickler) or "B.U." (for Bring-Up), and the date on which the item should again come to the attention of the administrator. Let us say that that date is April 20, 1956. The secretary then opens her 3 x 5 file and makes a notation under "C", "curb and gutter—Smith—B.U. 4/20/56", the memorandum is then placed in the regular large file in the folder behind No. 20. On the 20th of each month the folder marked "20" is removed from the file drawer and placed on the administrator's desk. He can then select out those items that are current ones and leave in the file those items that are to be dealt with on the 20th of the ensuing months. On the 20th of April 1956, he would pull out the memo regarding curb and gutter for Smith and either initiate action to have the work done, or if construction season is not far enough along, he can set it forward to another B.U. date. He will note on the bottom of the memo whatever action he has taken and return it to the Bring-Up File for an additional follow-up, until such time as the job has been completed and a report has been submitted.

A good deal of judgment must be exercised as to the type of thing which goes into such a file. It can become a monster if too many details are placed in it, and on the other hand it can die of starvation if little or nothing is placed in it.

Hard experience has shown me that it is particularly prudent to keep the tickler well supplied with items of really major importance such as my wife's birthday and our wedding anniversary. As a matter of fact the system pays for itself on those items alone!

● COMPLEX stereoplotter is used in contour mapping of difficult terrain.

● PHOTO-reconnaissance at heights of 30,000 ft. is performed in the P-38.

● AERIAL maps speed design and location for many state highway projects.

● THEODOLITES are used to establish the ground control for the air photos.

CHARLES M. HODELL,

Vice President,

Aero Service Corporation

PHOTOGRAMMETRY SAVES TIME AND ENGINEERING MANPOWER

THE pending program for expansion and integration of a Federal highway system, if it is made a reality by Congress, will mean a very rapid acceleration of construction. Before the construction phase, the load will be upon design. Before design the load will be placed upon maps and surveys; and it will be difficult to expand engineering staffs quickly to meet this engineering load.

Photogrammetry is a tool which can be, and is being, used by many highway departments to ease the pressure in this important phase of engineering work. Aerial mapping method is accepted as a standard engineering procedure by many state highway departments, by the United States Geological Survey, by the Army Map Service, by consulting and design engineers, and by the United States Bureau of Public Roads.

Photogrammetric maps can be used for preliminary location and design and for detailed location and computation of earth quantities. They also permit estimation of drainage and run-off problems, and of culvert locations. The photography which is a part of the map-making process is useful for soils surveys, location of borrow pits and gravel deposits and for right-of-way studies, as well as to evaluate structures, properties and access problems. Monumented control, both horizontal and vertical, can be established as part of the mapping process and these control points are available for the highway engineer to tie in the P-line.

The advantages of the use of photogrammetry for these purposes are: (1) It reduces the requirements for engineering manpower in the collection of information and mapping data necessary for planning location and design; (2) The savings of both time and money are appreciable. Our work on the Pennsylvania Turnpike was about five times as fast and done at one-fifth the cost of conventional ground surveys. In the case of the Illinois Turnpike, it took 75 days to deliver 5-ft. interval contour maps of the 465 miles under consideration by the Illinois Toll Road Commission. (3) The information gathered by photogrammetry is much more extensive and detailed than is usually obtained by ground methods. Generally the photogrammetrist furnishes a strip of topography at a 5-ft. interval, with a horizontal scale of 1″ = 200 ft. The width of the strip allows the location engineer to study optional routes without any further work in the field.

In flatter terrain, a 2-ft. contour map at a horizontal scale of 1″ = 100 ft. is preferred; at this scale a strip 1,500 ft. or 2,000 ft. in width is customary. From this type of map, preliminary earth quantity computations can be made reliably. These maps contain detail which helps the design engineer to solve many of his problems.

A third type of detailed map now possible by photogrammetry is a map at a horizontal scale of 1″ = 50 ft., and a contour interval of 1 ft. This type of map is used for detailed studies in the development of road programs in built-up areas where property values are high and considerable detail is required, including accurate positioning of curbs, poles, walls, hydrants, trees, manholes, and buildings. The plotting accuracy for horizontal position in this type of work is one-fiftieth of an inch, or at this scale, plus or minus 1 ft. Such maps may provide a basis for quantities accurate enough for bidding earthwork.

Photogrammetric methods, when properly planned and executed, can produce these maps to meet the National Map Accuracy Standards which state that "90 percent of all horizontal positions should be within 1/40 of an inch at the final map scale" (for a map at a scale of 1″ = 40 ft. this would be 1 ft.) and "90 percent of all the contours should be within ½ of the contour interval" (for a map showing 1 ft. contours, 90 percent of the contours would be within six inches).

This article is based on a paper presented at the annual meeting of the Highway Engineers of Missouri.

INDUSTRIAL WASTES GAUGING TRAILER CHECKS FLOW AND pH MEASUREMENTS

ARTHUR D. CASTER,
Principal Engineer, Sewage Disposal,
Dept. of Public Works,
Div. of Engineering,
Cincinnati, Ohio

ONE of the essential activities included in the Greater Cincinnati Metropolitan Sewage Disposal Program is the gaging, sampling, and analysis of industrial wastes discharged by some 700 industries into the sewerage system and which eventually reach the sewage treatment works. Such an operation is necessary for the purpose of establishing equitable surcharge rates based on waste strengths and for the protection of the sewerage system and treatment works from toxic and otherwise undersirable waste constituents.

It is, therefore, imperative that the field operations of flow measurement, sampling, compositing and pH determination as well as laboratory analyses must be carried out with the highest possible degree of precision and accuracy. Laboratory precision is relatively easily attained, but accuracy in the field presents a variety of problems. To combat these problems, engineers of the Sewage Disposal Section have designed and developed several items of special field equipment which greatly increase the reliability of field determinations.

Perhaps the most versatile and useful of these devices is the Industrial Waste Gaging Trailer designed entirely by the Sewage Disposal engineering staff and built by maintenance personnel of the Little Miami Sewage Works. It is fitted with a pneumatic flow recorder, an electrically operated pH meter, and a pH recorder. A self contained gasoline engine generator and electrically driven air compressor enable use of the trailer away from an external power supply. The equipment is all fully automatic and the trailer could be left unattended if necessary, although it is not general practice to do so. Figure 1 shows the general construction of the trailer.

Equipment Design — The basic trailer is an army surplus, two-wheeled, 1-ton unit with the body removed and replaced with a flat plywood bed. It is equipped with a standard ball-socket hitch, a hand brake and turn signals. Three jack-screws were installed, one on each rear corner and one on the front tongue, to serve as adjustable leg supports to enable the trailer to stand by itself. Red signal lamps are on each corner for purposes of identification at night.

Structural steel angles were welded together to form a rigid frame for the body box. The side and end panels are of marine plywood and are hinged at the top for opening and exposing the instruments and other equipment. A generous amount of space is provided for tools and other items of equipment.

The pneumatic flow recording apparatus consists of a transmitter, receiver, and accessories. The transmitter is of the air-bellows type providing an output air pressure directly proportional to the level over the crest of a 90° V-notch weir. It is actuated by a bubbler pipe system which converts the head on the weir to an increased pressure of from three to 15 psi, the former representing the instrument zero and the latter the instrument maximum.

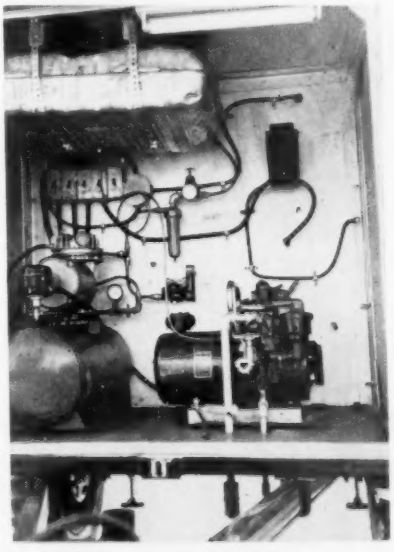
The receiver operates with a corrosion resistant metal bellows and incorporates both a totalizer and recorder. The totalizer is driven by a 110 volt AC motor and the recording chart is rotated by a synchronous electric clock mechanism. Both totalizer and charts are direct reading. This direct reading feature is accomplished by use of a "characterized" cam on the totalizer and logarithmically-spaced chart on the recorder.

Air pressure for the instrument is supplied by a 20 cfm electrically driven air compressor. The compressor is fully automatic and is furnished with a storage tank of 5-gal. capacity, intake air filters, and overload safety mechanisms. Power for the compressor motor as well as all other electrical devices on the trailer is supplied by a gasoline driven 115-volt, 60-cycle, single phase generator with a 100-watt power output. However, if an outside source of electricity is available, it is used. Figure 2 shows the power plant and generator installation.

The pH apparatus includes a potentiometer, recorder, electrodes and accessories. The recorder chart is rotated by a motor drive operating

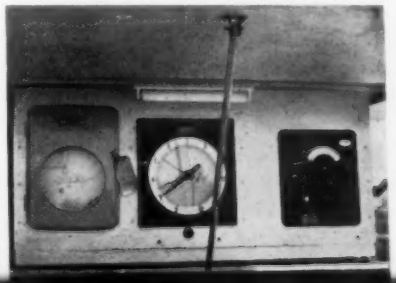
(*Continued on page* 128)

● **FIG. 1. General construction of trailer, with sides up is shown here.**



● **FIG. 2. Power plant and generator installation permits independent use.**

● **FIG. 3. Instrument panel is complete and readily accessible for use.**



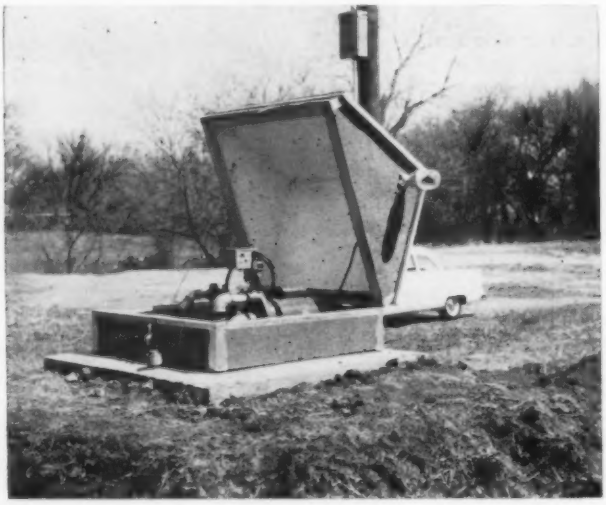
SMALL WELLS NEAR RIVER BED PROVIDE EMERGENCY SUPPLY

THIS YEAR'S impending drought has forced many municipalities, both large and small, to search for new water sources. Many areas of the Southwest are not fortunate enough to have subterranean water sources of sufficient size to support commercial exportation. Principal water supplies are obtained from reservoirs, but lack of sufficient runoff and the unusual increase of small farm ponds and soil conservation practices have reduced the amount of runoff into these reservoirs. This, together with the increased population and increased per capita consumption has produced a critical situation.

Most towns and cities have long range programs for increased reservoir storage; however, an immediate answer to this problem is confronting many small municipalities in this area.

Most of the small streams and rivers have a sand or gravel bed lying close to the surface that is quickly filled when the stream is flowing. These gravel and sand bed areas are generally not large nor of very great depth; however, in times of emergency they can yield substantial amounts of water. Their general conformation does not yield itself to a plan of several large wells, but generally a number of small, closely spaced wells are found to work effectively.

The city of Perry, Oklahoma, has a system of three reservoirs, all of which are nearing a new low. After much consideration the City Council decided to try a system of small wells located along the creek beds behind the reservoirs. A number of test holes were drilled, and four wells were contracted to the Yarborough Water Well Drilling Company of Enid, Oklahoma. These wells were drilled with a Failing 1500 heavy duty drilling rig and reamed to 8 inches diameter. Six inches standard well casing was set to an average depth of 45 feet. Since



● **PUMP house is pre-fabricated and is approximately 3 ft. square. It is fully insulated against freezing conditions.**

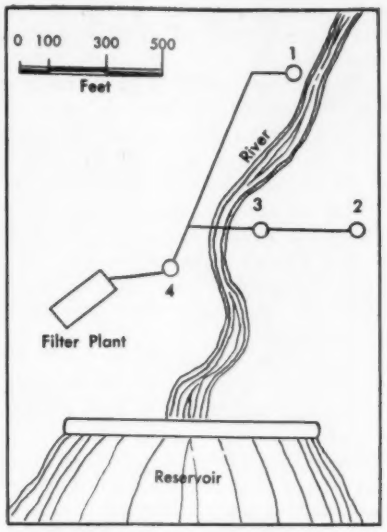
● **TRENCHING was a problem, because of residential lawns so the contractor used a small, light weight Ditch-Witch.**

● **TRENCH was dug to an average depth of 24 inches, which is below the frost line for this part of the United States.**

● **GATHERING system for the well connections cost 36¢ per foot for the 1½-inch plastic pipe used for the installation.**

all of the original wells were located in a flood area, it was necessary to build up a mound of dirt at the well head for the pre-fabricated pump house. This small house, approximately 3 ft. square, is fully insulated and contains two heat lamps that are thermostatically operated to prevent freezing. The pumps are equipped with safety switches and indicator lights which are located on the outside of the house for easy visual inspection.

One of the larger problems was an economical gathering system for the well connections. 300 feet rolls of 1½-inch Carlon plastic pipe were used for the installation. This pipe was buried to an average depth of 24 inches, which was below the frost line for the area. The trenching problem in this instance was an obstacle, because of restricted areas, residential lawns and road crossings. For this job the contractor chose a small, light weight Ditch-Witch trencher made by The Charles Machine Works. The trencher's low initial cost and maintenance, plus the narrow trench size (6 inches) made it ideal for this type of operation. 1700 feet of gathering line were installed in one and one-half days by a two-man crew.



● **DRAWING showing the four wells, filter plant and reservoir.**

Labor cost and maintenance on this small trencher was less than $20 for the total job, or about 1.2¢ per foot of trench.

Overall cost to the city for the four original well installations, complete with automatic controls, pumps and housing amounted to $2400, or $600 each. The 1700 feet of gathering lines were placed at a total cost of $782. Unit costs were 36¢ per foot for the 1½" plastic pipe and 10¢ per foot for trenching with the Ditch-Witch and backfilling.

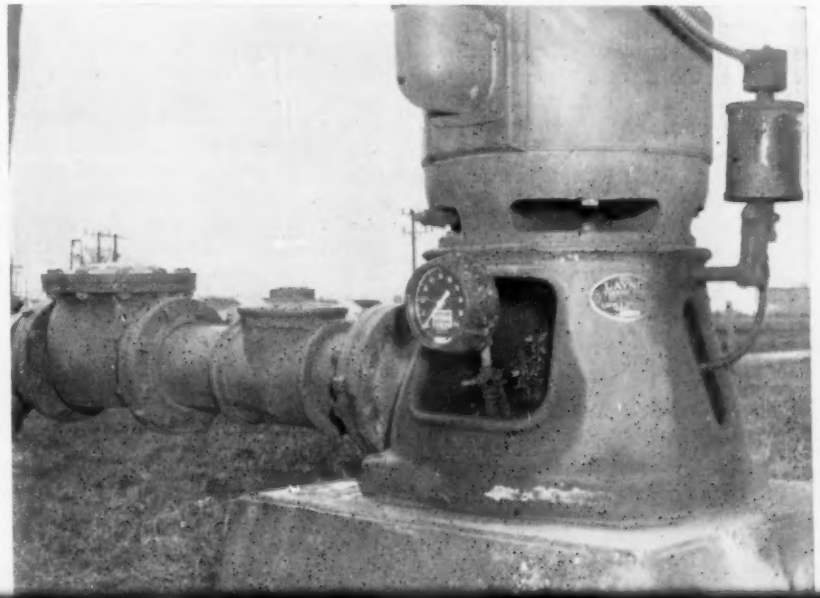
The four well installation yielded approximately 90,000 gallons per 24 hours on the original test. Whether this volume can be maintained over a long period is doubtful, because of the type of gravel formation that is present. However, the moderate cost of these wells makes it possible to have a substantial number of them so that by regulating the flow, the well installation will serve its purpose in times of emergency.

GETTING THE MOST FROM YOUR WELL SCREENS

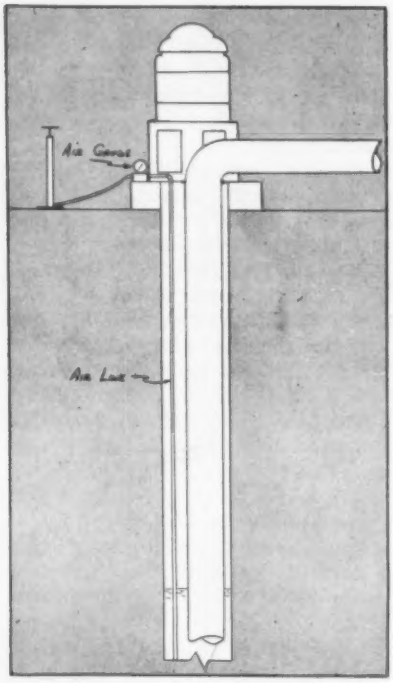
PAUL W. CLINEBELL, Instructor, Sanitary Engineering, University of Illinois, Urbana, Illinois

A particularly vulnerable and relatively inaccessible link in municipal or industrial water supplies dependent upon wells in unconsolidated formations is the well screen. Unsatisfactory functioning, or structural failure, of this essential component may cause an interruption of the supply or devaluate an expensive investment. Therefore, every effort should be made to lengthen the life expectancy of this vital structure.

Essentially, the well screen is a device for holding back the unwanted portions of the formation, at the same time allowing the relatively free flow of the water into the well. In addition to functioning properly, the screen must be able to resist the chemical action of the water and the physical action of the formation with which it is in contact. No less violent are some of the chemical and physical remedies to which clogged screens may be subjected. Great strides have been made by the manufacturers in designing and fabricating screens to take such punishment. Their contributions can have a greater value, with the cooperation of well drillers, through proper



● **INSTALLATION of air line and gauge for water level measurements.**



● **DIAGRAMMATIC sketch showing a typical installation of an air line.**

installation; but the greatest need is for better cooperation from the persons responsible for the operation of the well. Only by following sound operating principles can the longest service life be secured from a well screen.

Operational Difficulties

Of the ills which befall well screens two general categories can be recognized. In the first category are included clogging of the screen and adjacent formation by chemical, physical or bacteriological action. Secondly, the screen may be attacked by chemical or physical action which produces enlarged screen openings or weakened structural strength. With the second category, the disastrous results may well be sand pumping or structural failure of the screen.

To be more specific, the first category would include incrustation, sand locking and bacterial growth on or around the screen. Incrustation usually results when water containing a dissolved mineral, such as calcium carbonate and carbon dioxide, is exposed to a reduced pressure as occurs when the water enters the well screen. This reduced pressure allows the escape of the dissolved carbon dioxide gas which in turn reduces the capacity of the water to hold the dissolved calcium carbonate. A hard impervious deposit which, during formation, may also cement deposited sand and silt grains, builds up on the screen and clogs the screen openings.

In areas where iron is present in the ground water, bacterial growth on the screen may cause clogging. Usually an iron content in excess of 2 ppm is associated with this condition, though lesser amounts may support some growth. The metabolism of the bacteria produces a gelatinous ferric hydroxide which, when deposited on the screen will trap other suspended matter from the water. This accumulation will of course, in time, greatly restrict the flow of water through the screen into the well.

Sand locking of the screen is a physical process by which the openings of the screen become blocked by sand grains. The present trend is to select well screens with openings large enough to permit a large percent of the sand grains to enter the well and be removed during well development. Over pumping and changing conditions in the formation may bring sand grains to the screen surface which will not pass the screen openings, yet will effectively reduce the size of the openings.

Erosion and the numerous types of corrosion to which well screens are subject, comprise the second category. Corrosion is a chemical attack and removal of the screen material. Erosion is the physical wearing away of the metal, usually occurring in the vicinity of the screen opening. This action is intensified by the abrasive material, carried by water, moving at a high velocity. Both conditions are more likely to take place during abusive operation of a well. Loss of material from the screen is then the common characteristic of erosion and corrosion.

As listed by Briggs (1) the forms of corrosion which may attack well screens include: 1) uniform attack or general corrosion; 2) galvanic or two-metal corrosion; 3) dezincification; 4) concentrated cell corrosion; 5) pitting; and 6) intergranular corrosion. Of these six, general corrosion is more frequently found to occur. With this type of corrosion, as the name implies, the attack is general over the surface of the screen. Some of the early screens, which were fabricated using two metals, succumbed to galvanic or two-metal corrosion.

The manufacturers of well screens have given corrosion and erosion prevention a great deal of consideration. Current methods and materials for construction of screens greatly aid this cause. Galvanic corrosion has been substantially reduced by the discontinuation of bimetal screens. The use of corrosion resistant materials, such as Everdur, Monel metal, Stainless Steel and Silicon Red Brass, has been helpful in combating general corrosion. Construction procedures have been improved to insure the fullest utilization of the inherent characteristics of these alloys. Not as much can be done by the screen manufacturers to discourage screen clogging especially from incrustation and bacterial action.

The value of scientific design and construction of well screens can be lost by improper installation. Selection of the proper size openings for a particular formation is a responsibility of the well driller with able assistance from the screen manufacturer. Analysis of a drilling sample from the area where the screen will be located gives valuable information in choosing the correct type of screen.

Careful handling and accurate placing of the screen is the responsibility of the well driller. The process of developing the well is a most important addition to proper placing of the screen. Development consists of surging the well, by pumping or plunger action, so as to secure a rearrangement of the particles of the formation. By this action, a greater yield can usually be expected from the well. Other benefits, which may be secured by development, include less probability of sand locking and a reduction in the amount of incrustation occurring, due to a diminished pressure differential at the well screen.

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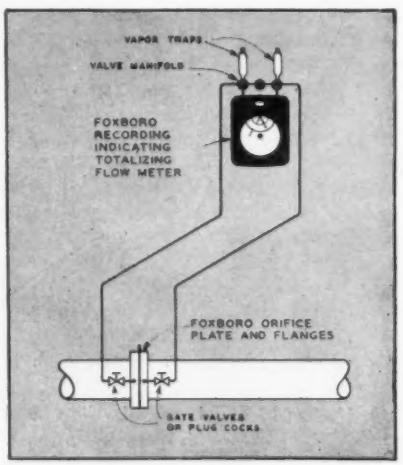

● **TYPICAL orifice plate flow meter for measuring pumpage from well.**

To Meter or not to Meter

RALPH L. YANISH

City Manager, Quakertown, Pa.

TO METER or not to meter Quakertown's water supply was the question which confronted the Borough Authority and the Town Council early in 1953. The Borough's water system had been acquired by the Borough Authority from a private concern in 1941 and had been turned over to the Borough to operate. The understanding was that the Borough would establish rates sufficiently high to operate and maintain the facility and to provide for adequate depreciation and renewal requirements. Any funds remaining were to be returned to the Authority for use in financing capital improvements.

Since a lower source of supply had been developed in 1951 that practically doubled the water available, there was no great need, from the conservation viewpoint, to install meters at that time. However, both parties were concerned with the rapidly growing water demand and the fact that the supply from one original source was constantly diminishing. Accordingly the writer was requested by the Authority to investigate and report on the problems and the costs which would be involved in converting to metered registration, and to institute a public relations program which would prepare our consumers for this change. Local government officials urged that particular attention be given to this latter phase of our program since they were anxious to avoid, insofar as possible, criticism by the public and plumber's organizations encountered at other localities when making this change.

Establishing Costs

Cost requirements were very readily estimated since several nearby communities had recently completed similar programs. Based upon a total requirement of 1350 meters, we estimated the over-all cost as $40,000. It was then determined by the Authority that a program which did not exceed this amount could be financed from the accumulated operating surplus from previous years. The actual cost was slightly over $37,000 or a unit cost of about $27.40. In setting up our original estimate, we utilized a cost of $22 per meter plus an installation charge of about $8 each. This latter figure was determined after observing about 25 meter installations made by our Water Department employees and local registered plumbers.

Prior to instituting the program, it was also essential that we determine with some degree of accuracy the estimated reduction in consumption which would be experienced with the installation of meters and the rates that would have to be established to meet the requirements of the Borough's agreement with the Borough Authority. In preparing this study, the Authority suggested that the then existing water revenues be increased at least 10 percent in order to meet rising costs of operation and to assist in amortizing the costs of the meters.

In approaching this problem, we had the advantage of noting results of a nearby community of about the same size which had converted to metered registration several years previously. At this location they were experiencing an average per capita consumption of 60 gallons per day which figure was reduced to about half by the installation of meters. However there was reason to believe that local consumption would not experience such a reduction if this change was made. To explain, there had been thirty odd test meters installed throughout the Borough at homes, varying in occupancy from two to eight persons, and of different financial circumstances. The observations made at that time show a variation in per capita usage from 17 to 70 gallons per day with the average about 45 gallons. Taking this into consideration, it was our studied opinion that the Borough would not experience anywhere near the reduction in usage reported by other localities. Accordingly we set up a suggested rate schedule based upon an anticipated drop in consumption of 15 percent. Actually after over six month's study of our water consumption under metered registration, *our usage has increased about 5.6 percent.* This despite the fact that there has been no material change in population and that our local water rates must be considered fair in comparison to larger companies. Local government officials contemplating similar conversion programs might well keep this in mind.

The findings of our studies were

● **FINAL METER installation is inspected by the author. With Mr. Yanish are Councilman Charles Knapp and H. J. Borchers, Jr., representing Neptune Meter Co.**

● **"KORNERHORN" water meter setting helps installation in tight places. Photo courtesy of Ford Meter Box Company, Inc.**

then passed on to members of the Quakertown Borough Council and the Authority at a joint meeting where members of local service organizations were requested to give their comments. The consensus of opinion was overwhelmingly for such a conversion program although a minority felt that preference should be given to the installation of water-softening equipment. To those municipalities contemplating such a change we cannot emphasize too highly the desirability of a publicity program outlining your intentions. Ours included numerous newspaper articles and talks at local service clubs by the Borough Manager and other local officials. We believe our good fortune in keeping complaints to a minimum can be attributed largely to the fact that we continually stressed that metered regulation represented the only fair way to charge for water. In addition, we emphasized the following: (a) It would minimize water waste; (b) every consumer becomes a self-interested guardian of the water supply; (c) it might render unnecessary the anticipated replacement of several of our mains; (d) fire protection would be improved; and (e) it would provide an equitable means of charging for sewer service in the future.

The Borough Manager, also acting as engineer for the Authority and the Borough, was instructed to prepare an ordinance to cover the proposed program and to incorporate therein the rates which would be applicable for such service. Ordinance #484, made effective April 1, 1953, provided among other things that no new flat rate consumers would be accepted after that date, that charges under the then-effective fixture rate should be increased 10 percent immediately and that a metered rate would be established as indicated therein.

The program as set up anticipated that the Authority would pay for the meters and the ordinary costs of installation. It was understood, however, that they would not pay for the cost of re-routing or replacing old pipes as might be required in connection with some of the installations in our older homes. Since Quakertown is relatively one of our older communities, quite some difficulty was anticipated in handling this phase of the work. This was considered a reasonable policy in comparison to that where consumers were required to pay for the cost of the meter and the installation or where the municipality furnished the meters but required the consumer to absorb the expense of installation. It was also provided locally that the property owner had the option of having the Borough arrange for the installation or to do so themselves by employing a plumber of their selection. In such event, the Borough would furnish the meter and the material required, and pay $6 toward the labor costs.

The work proceeded by wards with selection of the order of procedure determined by lot in open Council meeting. All consumers received a special notice with an attached card which they were requested to return indicating their preference as to the method of installation.

Bids were asked on furnishing 1350 ¾-in. by ⅝-in. water meters based upon delivery of 500 meters by April 1, 1953, 500 meters by August 1, 1953, and 350 by January 1, 1954. Four bids were received, varying in price from $20.16 to $20.42 each.

Samples of all meters were made available for test and inspection by officials of the Authority and Borough Council. It was the opinion of the writer and our Water Plant Superintendent that all four meters were sound structurally and from an operating viewpoint, and that none offered any appreciable advantage. It was then decided to purchase the Trident Meter from Neptune Meter Company, chiefly because we had had excellent service from this meter locally and had an ample supply of parts on hand for it.

Shortly before enactment of the enabling ordinance, informal inquiry was made of our local registered plumbers to determine if they were interested in installing these meters; and if so, the estimated cost of performing this work, either on a flat rate or hourly basis. Of twelve inquiries sent out, replies were received from five. Three suggested a lump sum price of $7 and two quoted a price of $9, plus materials. On an hourly basis, a charge of $2.10 was suggested by all for a master plumber and from $1.60 to $1.85 for a journeyman worker.

Final Arrangements

Upon receipt of these informal bids, we were considerably concerned as to whether our original estimate would be ample to cover the work. Accordingly several meetings were held with our local plumbers at which time they were informed that we much preferred to have them do the work and that we were willing to pay a reasonable charge for their services. However on twenty-five experimental installations, it had been our finding that the average cost amounted to $5.22, including labor and materials. This figure was based upon an hourly team rate of $3.75 per hour for a registered plumber and his helper.

The plumbers were advised that the Borough Authority would discard the idea of setting up its own organization to install these meters, providing they cooperated with us. To this, the majority agreed. It was understood that where the property owner selected the plumber, they would be paid by the owner and that he in turn would be reimbursed by the Authority in the amount of

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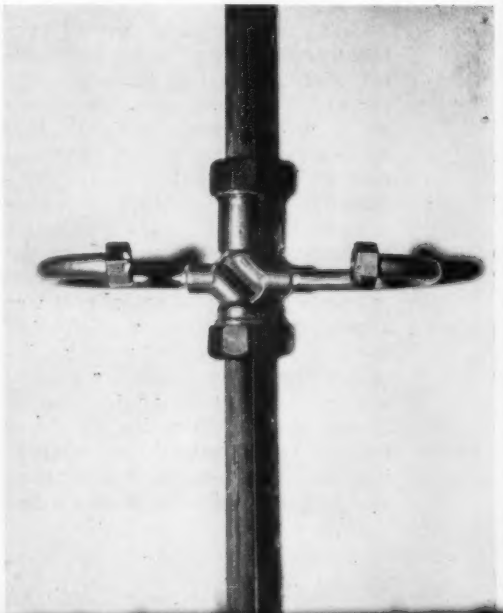
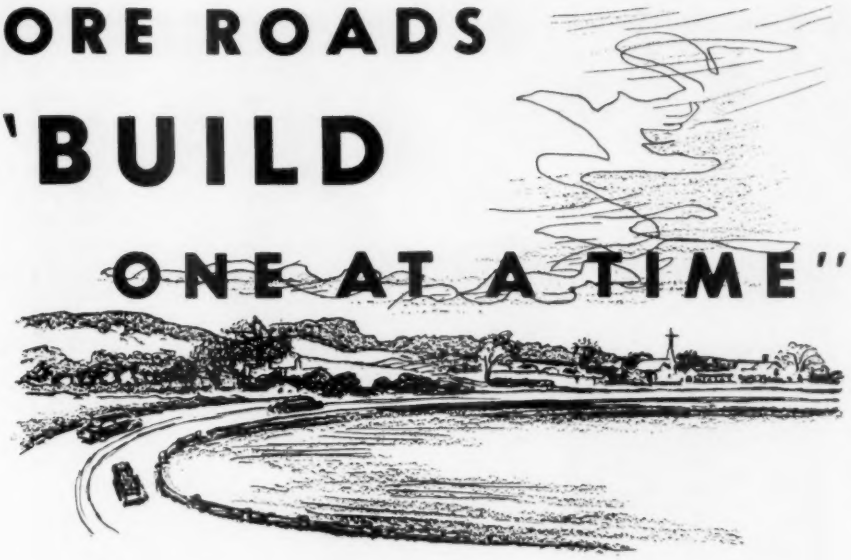


● **COMPRESSION ends of this meter yoke permit installation in service line without worry about trying to cut threads in an old pipe. Photo courtesy of the Mueller Company.**

TO GET MORE ROADS "BUILD ONE AT A TIME"



ARNOLD NICHOLSEN
Supervisor
Town of Greenville, Greenville, N. Y.

This article demonstrates how individuals solved pressing problems in a small rural township in Greene Co., New York. Situated 25 miles southwest of Albany, the town of Greenville covers 40 square miles, has a population of 1600 and an assessed valuation of $1,100,000, and comprises a whole or part of seven hamlets.

IN 1920 at the age of six I moved with my parents to our present location on a farm in Greenville. We lived on a town road 2½ miles from the nearest state road and for many years experienced almost every type of difficulty it is possible to encounter in traveling town roads. In the winter we fought snowbanks which blocked roads from stonewall to stonewall. In the Spring we drove horses and wagons through mud which was often hub deep. Later, when we drove cars we had sink holes and often were compelled to jack cars up, fill in with stones and thus hope to continue on our way. The roadway width was in most cases 8 to 10 ft. with a one or two-ft. shoulder on either side.

In the mid 1920's highway superintendents in our area began to use shale on the roads, since no gravel is available in this area, and we began to get partially out of the mud. But it was always a case of too few funds with road improvement lagging far behind. Bushes needed cutting, trees needed removing, turns needed straightening, roads needed widening and above all shale was needed in order to get and keep the increasing amount of traffic out of the mud.

Requests were made by the people to "please try and do something." Nothing happened; year after year the situation remained the same. New officials were elected to office and we hoped that now something would be done; but as time wore on the same conditions prevailed. Several times a year the town highway trucks would roll by sprinkling a few loads of shale here, a few shovels full there and occasionally shaling a stretch of road quite well. Always before election the roads were graded in order to remind the voters that a town highway force was still in existence.

Starting in 1920 in the summer resort business my parents continued to expand each year. We now accommodate nearly 200 guests. Despite the handicap of a poor road, narrow and bumpy, with bad turns and other hazards, we continued to build up our business by a great deal of hard work.

When the town board and the highway superintendent stated there were no funds, I offered to pay the wages of the men working for the town highway department and put gas and oil in the town equipment providing that they would do work along the town road on which our business depended and which was used by at least 22 other families almost daily.

State Aid Funds

In 1949 information was released to towns all over the state that, beginning in 1952, the state would render up to 75 percent financial assistance under the Erwin Plan program to enable towns to improve the town highways to certain minimum specifications. In general, such specifications asked that the roads be widened to a 16-ft. minimum with 5-ft. shoulders on either side; that good drainage be provided; that backslopes be graded; that there be evidence of not less than 12 ins. of compacted gravel or shale over the entire width of the road; and that bad curves be eliminated.

When I first heard of the Erwin Plan in 1949 it seemed like a godsend to residents living on town roads and I was convinced that our town, and other town officials all over the state, would go all out for road improvement under this program—particularly in view of the large amount of aid which the state was giving.

Since the program was a 10-year plan the town board which was in office in 1951 was asked to set up a program for this length of time to enable the state to plan for its obligations under the program. With a total of 62 miles of road in the entire town, this town board planned a program of two miles annually for the ten-year period. In the first year of the program—1952, it built one-third of one mile and followed up by doing no construction in 1953.

In view of this situation a number of citizens became aroused sufficiently to nominate several new candidates for office, including myself. Having good businesses of our own we were reluctant to run for office but the job needed doing desperately and we agreed to tackle it and make as much progress as possible during our two-year term of office, if elected.

With the support of the people we were elected to office at the November election in 1953. I proceeded immediately to lay the groundwork for proposals which I hoped to make to the new town board at our first

● **LOOKING southwest from end of presently completed section of a rural township road in Greene Co., N. Y. Minimum width of traveled road surface is made 16-ft.**

meeting in January. During November and December I spent 25 days visiting the top officials in the various state departments and getting the answers to many questions concerning roads and road building; erection of a town machinery building and town office; equalizing assessments throughout our township and caring for other vital town matters.

Our 1954 Program

By holding two or three special meetings of the town board weekly, plus a 12 to 14-hour working day seven days a week on my part, countless trips to the office of the County Attorney and to the many state departments in Albany, we were able to put an ambitious program into effect. Members of the town board include the supervisor, two justices of the peace, two councilmen, one town clerk and the superintendent of highways.

By February 1st we had a $30,000 bond issue for construction of a new Town Garage and Town Office ready and passed by a public vote of more than two to one. By mid-February we had purchased a new Ford dump truck and a new portable air compressor after public bids.

Our town has a total of 62 miles of town road, all with shale surface, much of it worn out, and all roads suitable for one-way traffic only. In Item I of the Highway Budget $9500 was raised which was supplemented by $2340 in state aid; Item II provided $500 for the bridge fund; $4,000 was made available in Item III for machinery repairs, parts, etc.; Item IV moneys consisted of $1500 for snow removal and $1,000 for cutting brush. From a 1953 Erwin Plan project which was never begun $1900 was left over; and there was $1900 raised for a one-mile project planned in 1954. These funds were available to our new town board when we took office on January 1st, 1954. They represented a very inadequate amount for the program we desired to undertake for the year.

Through the assistance of Joseph Heck, Acting Director of County and Town Highways for the State of New York, it was found that a surplus could be created out of Item I moneys as our state aid was based on the first $3,000 raised for that item in the budget. For years $3500 of Item I moneys had been used for putting oil on town roads in front of residents' homes. By using this money to create an additional surplus of $2400 we were able to plan immediately for construction of three additional miles of Erwin Plan road for which we would receive an additional $15,000 in state aid.

Bids Advertised

Now came a big problem. Our town had one old dump truck which on road construction would consume 60 to 70 gallons of gas per day; one ¾-yd. Chevrolet dump truck; our new Ford dump truck; a large Unit power shovel; a large Galion power grader; a new compressor; a York tow-type grader; and a power roller. Our town highway forces numbered three full-time and three part-time employees. It was necessary for these men to maintain our other roads as well as to work on the new construction. Therefore, it was necessary to advertise for bids or to rent machinery. We decided to advertise for bids and hoped that we could find a contractor who would bid low enough so that we could build our roads at a cost not to exceed $7,000 per mile.

Feeling that our town forces could build two miles of road, we advertised for bids on three miles of Erwin Plan road construction. In the contract we stipulated that the contractor should do such work as removing trees and brush, rough grading, installing culverts, trucking material and leveling—with the town furnishing the culverts and material.

We had estimated in advance the cost of culverts and material so we

● **BULLDOZER starting to break ground on widening job. Narrow and worn out roads were major problems facing the town board and the highway superintendent.**

knew approximately how much we could afford to pay a contractor. On opening the bids we were pleasantly surprised to receive three bids—$11,700, $14,000 and $18,000. Our town board decided to award the contract to the $14,000 bidder since it was a large concern nearby with much equipment and a reputation for doing good work.

Agreeing that we should use all new culvert pipe on the projects we advertised immediately for bids on more than 1200 ft. of pipe ranging from 12 ins. to 54 ins. in size. We received five bids and took the lowest bid.

Costs Of Our Projects

Since the contractor was working on a very close margin, we felt that it would probably be to our advantage to help him wherever possible so that he would be willing to undertake future Erwin Plan projects in our town. So we purchased a power saw and our men began to assist the contractor in tree and brush cutting. It was also necessary to do considerable drilling and blasting of shale in order to get material for the roads; and our highway employees did the final grading and rolling of the projects. The more we worked together the more advantages we saw in coordinating all equipment and manpower toward maximum efficiency.

Work began on February 23rd on our first one-mile project and was completed on April 7th in spite of snow, rain and cold weather. A breakdown of the total cost of the project is as follows: Town payroll for cutting brush and trees, blasting and building a road to the gravel bank, $1267.60; rental of bulldozer, $40.00; dynamite, $246.00; gas and oil for town equipment, $243.00; culvert pipe for entire job $621.55; shale $150.00; paid to contractor for his work, $4666.00. The total cost was $7234.54.

Our second project of 2.3 miles was begun on April 8th and completed on May 27th with the exception of final grading and rolling which was completed early in June. A breakdown of the total cost of this project is as follows: Paid to contractor for his work, $10,729; town payroll for cutting brush, trees, grading, rolling, dynamiting ledges and shale $2,565.85; sluice pipe $1,448.86; shale $486.00; calcium $462.00; gas and oil for town equipment, $234.49; dynamite $142.00; and truck rental $42.00. The total cost was $16,110.20.

Results of our mutual cooperation were so satisfactory that we engaged the contractor and his equipment to assist our highway forces in completing the five miles of planned construction. Our fifth mile was completed and accepted by July 10th, less than five months after we began work. We managed to stay within the $7,000 per mile figure except on the first mile of road building.

As a result of the state aid available for constructing these roads we were able to raise the salary of our town road employees to $1.25 per hour for laborers, $1.40 per hour for truck drivers and $1.65 per hour for machine operators which is well above the scale presently paid by other towns in this area. Our men have been well satisfied and have been producing a full day's work.

Our 1955 Program

Town highway residents are enthusiastic about our program and pleased with the speed with which the roads are being improved. As a result, I recommended a program of constructing seven miles for 1955 and the members of the town board have backed the program unanimously. Our superintendent of highways purchased an additional power chain saw and even now (the end of March) our highway forces have succeeded in clearing all brush and trees from the seven miles of road which we have scheduled for construction under the program during 1955.

Realizing the advantage of having plenty of equipment with which to work, we have made arrangements with the contractor to rent his machinery to assist our town highway forces in building this year's road program.

Road Surfacing

It has become obvious to members of our town board that we must make some provision for topping our new roads so that the problem of maintaining a shale surface might be minimized.

As a result we have decided to place a double-surface treatment on the five miles of road built during 1954. We expect to regrade and roll each project, treat with an application of penetrating oil followed by a coat of RC emulsion and 30 lbs. of No. 1a stone firmly compacted.

● **MORE roads like this one can be built, if they are built one at a time.**

We expect this surface to stand up reasonably well for 2 to 4 years; and that periodical single surface treatments will enable us to maintain these roads in the future. It is probable that calcium and salt will be utilized in maintaining other projects in order to reduce initial maintenance costs.

If our group remains in office, I hope for construction of 30 miles of town highway under the Erwin Plan within a five-year period providing the state aid formula remains virtually the same. That will mean that half of our town roads will have been brought up to a reasonably good standard. To me, road building operations today are but a small task in view of the large and efficient road building machines now available. Certainly good roads are something which benefit everyone everywhere. They are vital to the health and welfare of our nation and should be so considered.

Water Pollution Research in England

THE Report of the Water Pollution Research Board of the Department of Scientific and Industrial Research (Great Britain) for 1954 contains much data on a number of interesting projects. The following have been abstracted from the 66-page report, copies of which can be obtained from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. for 50 cents.

Oxygen Absorption—The previous report contained a note on a method which was then being tried for determining the rate of absorption of atmospheric oxygen by the water of the Thames estuary. In this method a light "tent" of polythene sheet was allowed to drift for several hours on the surface of the water, the volume and composition of the gases contained in it being determined at the beginning and end of each run. At that time it had not been possible to check the performance of the apparatus by an independent method. This has since been done by making measurements in a tank 64 ft. long and 4 ft. wide, filled to a depth of 3 ft. with fresh water. At one end was a wave-making device and at the other a damping baffle. By adjusting the wave-making machinery, waves of various amplitudes and frequencies could be produced and by removing the baffle these were reflected from the end of the tank, forming standing waves which appeared to be very similar to those formed during choppy conditions in the estuary.

The whole of the water was deoxygenated by adding a calculated amount of sodium sulphite in the presence of 0.02 ppm cobalt as catalyst. The wave-making device was then started and the rate of re-oxygenation of the water was measured both by using tents and by direct determination on samples of the water by the Winkler method.

With no surface waves the tent gave an accurate value; with steep regular waves and choppy reflected waves it gave too high a value; and with a smooth regular swell the value was too low. Thus it appears that measurements with tents in the estuary may exaggerate the variation in the rate of entry of oxygen under different wave conditions, though it should be pointed out that the experiments with the tank do not provide any information on the effect, on the rate of solution, of wind which is of course usually associated with rough conditions in the estuary. The reason for the inaccuracy, under some conditions, of measurements made with a tent is almost certainly that the motion of the surface within the enclosure is different from that outside; the difference appears to be greater the heavier and stiffer the material of which the tent is made. There is thus considerable uncertainty about the rate of solution of oxygen in the Thames under different conditions and indeed there does not at present seem very much hope of obtaining accurate values of this quantity by direct measurement. Results of one series of measurements in the estuary indicate an increasing rate of absorption with increasing wind velocity and wave height. The average value of the exit coefficient from this series of measurements is 11.6 cm per hour, which is equivalent to approximately 115 mg oxygen per sq. m. per ppm deficit per hour. The exit coefficient f expresses the depth of water in cm in which, under the conditions of the experiment, re-aeration would occur at a rate of 1 ppm oxygen per hour per ppm deficit.

Toxicity of Synthetic Detergents to Fish—Some preliminary experiments were made on the toxicity to rainbow trout of washing powders containing synthetic detergents. It is known that the surface-active agents which are an essential constituent of these powders — particularly active agents of the alykl aryl sulphonate type — are not completely destroyed in passing through a sewage disposal works; if toxic, therefore, they may be of importance where a sewage effluent is discharged to a fishing stream. In the work so far carried out the toxicity of a mixture of equal weights of seven popular proprietary washing powders was determined. The concentrations of anion-active detergent in water, to which different amounts of this mixture had been added, were determined by the method of Degens and were expressed as the equivalent concentrations of sodium lauryl sulphate, which was used as a reference substance. It is of course possible that any toxicity of a mixture of the proprietary materials might be due, at least in part, to constituents other than the surface-active agent; this possibility has not yet been explored.

In each experiment a solution containing a weighed quantity of the mixture of proprietary substances was prepared and was aerated continuously to keep the concentration of dissolved oxygen close to the air-saturation value; the temperature during all the tests was maintained at an approximately constant level by thermostats. Trout were first acclimatized to the experimental temperature of 17.5° C in clean water for two weeks and were then transferred to 40 litres of the test solution. They were transferred to a similar quantity of fresh solution each day during a total period of 85 days, unless all the fish had died in a shorter period. During these tests they were fed daily.

It was found that the periods of survival of individual fish in each concentration had an approximately log-normal distribution and the geometric mean period of survival was therefore taken as an estimate of the period equivalent to 50 percent mortality. Within the experimental period there was an approximately linear relation between the logarithm of period of survival and the logarithm of concentration of surface-active agent. The lowest concentration of washing powders examined gave by analysis an average concentration of anionic detergent equivalent to 1.26 ppm sodium lauryl sulphate, and this produced 50 percent mortality with a period of exposure of just under 12 weeks. With a concentration equivalent to 4 ppm sodium lauryl sulphate, the corresponding median period of survival was about 7 days. It is, however, not yet certain that the material in the sewage effluent is of exactly the same composition as that originally present in washing powders. It is possible that some

(*Continued on page* 152)

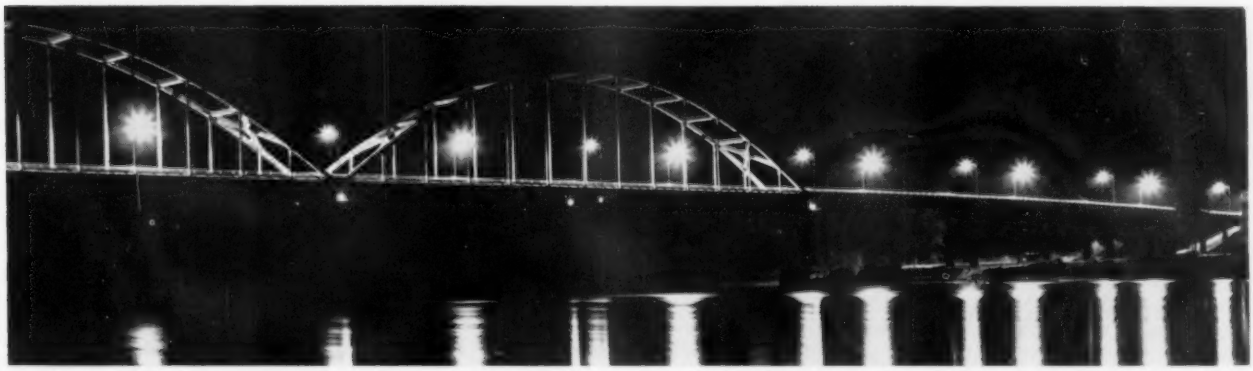
Speeds Sewer Construction

● **DURING construction of a new sewer line in Dallas, Texas, the contractor used a Drott TD-6 "Four-in-One" Skid-Shovel to dig in restricted areas, load trucks, backfill trench and haul pipe as seen in this photo.**

MODERN LIGHTING—

FOR LEAVENWORTH CENTENNIAL BRIDGE

ENGINEERS point to the simplicity of design in the new Leavenworth Centennial Bridge as one of its outstanding features, but the lighting is also unusual. This structure, built at a cost of $3.5 million, spans the Missouri River at Leavenworth and joins the states of Kansas and Missouri, providing a shorter route to Kansas City with a considerable saving in time. Construction began Aug. 31, 1953 and the bridge was dedicated on April 2, 1955—a period of only 18 months, in itself a record achievement.



● **NIGHT VIEW of the Leavenworth Centennial Bridge shows a number of the 30 lights installed on this modern structure**

The new bridge, a two-span, continuous, tied-arch structure supported on three piers, crosses the 841-foot main channel of the Missouri River. The east approach viaduct has seven deck-girder spans and the west approach viaduct has nine. Total length of the project between abutments is 2,436 feet. Total length, including structure and approaches, is approximately 6.5 miles. The main river piers were sunk to their shale foundations by a combination of open excavation and pneumatic caissons.

Into the project went 20,650 yards of concrete and 2,650 tons of structural steel. Shelby Willis, resident engineer in charge of overseeing construction, with Howard, Needles, Tammen and Bergendoff, consulting engineers, who designed the bridge, said all contractors moved a total of 1,154,114 yards of dirt. The bridge has a 26-foot roadway with 2½-foot walks on either side. At their centers, the arch spans rise 77½ feet above the roadway. The channel spans are 68 feet above maximum low water and 55½ above maximum high water. The deepest concrete is 45 feet below the low water mark. This is at pier three, the farthest east of the three river piers. The tallest pier, the center one, is 109 feet from bottom to top. It also has the largest base, 22x24 feet.

The modern lighting of the bridge is a source of much pride to the architects and engineers. There are 30 octagon shaped, continuous tapered Kerrigan Weldforged steel lighting standards, type 550-K, using GE lamps of 6,000 lumens, 370 watts, multiple, with 30-ft. mounting heights over the roadway. The fact that it is an interstate bridge makes it necessary that two separate utilities share in furnishing the lighting service. Service to 18 of the Kerrigan lighting standards is furnished by Kansas Power & Light Co., and service to the remaining 12 by the Platte City Electric Cooperative, Inc., Platte City, Mo. The lighting units were installed by and remain the property of the City of Leavenworth, energy and maintenance being furnished by the utilities.

● **GOOD roadway illumination results from the 30-ft. mounting height.**

The cost of construction was originally estimated as $4,000,000. Contributions of $500,000 each were made by the Missouri State Highway Commission and the Kansas State Highway Commission. Revenue bonds totaling $3,000,000 were sold to finance the balance of this cost. These bonds will be retired solely through the collection of tolls from the users, imposing no general obligation on the taxpayer. Based on data now available, the total cost will run to approximately $3,500,000. The saving of $500,000 was effected through diligent planning and cooperation of city officials and all agencies concerned. This saving will be used to reduce the bonded indebtedness, thus en-

(*Continued on page* 128)

Getting the Most from Your Well Screens

(*Continued from page* 102)

To alleviate chemical and bacteriological screen clogging, which cannot be prevented completely, chemical means have been devised. Acidizing, chlorination, and addition of poly-phosphates have met with varying degrees of success. The composition of the clogging material has an obvious influence on the chemical which will remedy the situation. In instances where such information is not known, experience from other wells in the general vicinity may indicate the type of trouble. At times it is necessary to use two or three of the chemicals in succession to secure the desired results.

Remedial Measures

Acidizing is probably the most widely used chemical means for removing incrustation of well screens. Both the material to be removed and the material of which the screen is constructed should be considered in selecting the acid to be used. Hydrochloric, nitric and sulfuric acids have been used. In each case the commercial available grade of acid is mixed with an inhibitor to decrease the action of the acid on the metal of the screen. This inhibited acid is poured into the well in and around the screen and surged several times over a period of 24 to 48 hours. Finally the well is pumped to waste until the water is acid free.

A relatively recent development in the field of chemicals for removing incrustation are the poly-phosphates. More easily handled than acids, the poly-phosphates, in some instances, have been more satisfactory in removing carbonate incrustation. The manufacturer of one of these products recommends the use of high test hypochlorite(2) to prevent bacteria which may be present from utilizing the poly-phosphate as food. Several separate applications may be necessary to secure the maximum desired results.

Chlorine treatment (3) gave satisfactory results after acidizing had been ineffective with two wells at the University of Illinois. In this case it was determined that bacterial action had caused the decreased yield. Other instances of its use, particularly for screens clogged with bacterial growth, are noted in the literature. As with acid treatment, chlorine solution is placed in the well, alternately surged and allowed to stand, then pumped to waste. Two or more cycles of chlorine application may be necessary if the organic growth is heavy or mixed with silt or clayey material.

Surging either with a simple plunger or by intermittent pumping may be used as part of the above mentioned chemical treatment, or as a separate operation to relieve sand locking. The primary objective is to force the sand grains away from the outside of the screen or draw them into the well to be removed by pumping or bailing.

Neglected Essentials

The efforts by the well screen manufacturers to supply a product which will withstand the rigorous environment to which the well screen is subjected can be nullified by unrealistic operation of the well. Some knowledge of conditions in the well and surrounding formation is necessary for such operation.

When a yield test is run on a newly drilled well, facilities for measuring the water levels and rates of discharge are available. Too often they are removed after the initial test and no thought is given to future measurements except maybe a yearly check of the water level. Too frequently pumping rates are only estimated, if recorded at all.

From a cursory inspection of information pertaining to ground water supplies in Illinois (4), it appears that more than half of these wells are, or have been provided with, an air line for measuring water levels. A considerable number of these installations are reported as being defective. This in- of the air line, reflects a most undesirable situation. Few municipalities or commercial concerns would allow another installation as expensive and important as a well to operate without checking and keep- formation, combined with the general tendency toward infrequent use ing records of its performance. Why then should this treatment be given to such an essential part of community life?

Systematic Operation

Systematic well operation can increase the length of time before corrective measures may be required and will indicate impending trouble. By systematic well operation is meant a realistic pumping schedule based on information secured from performance data. This data should be collected from two relatively simple instruments which should be a part of every pumping installation. A ¼-inch air line is the most widely used method for measuring the water level, both when pumping at various rates and under static conditions. Some means for measuring the rates of flow from the well should also be available.

Regular readings taken from these two simple measuring devices should be recorded in a permanent form. Although such records should be filed for future reference, frequent study of the records to detect trends is also desirable. Such study gives valuable information as to actual well performance and notice of impending or existing trouble. Having received notice of such trouble it is possible to begin remedial action before the conditions have progressed to a point where chemical or other rehabilitation treatment may be of little value.

If, under a constant rate of pumping, the records show an increased drawdown, clogging of the screen or adjacent formation is likely. On the other hand, data showing a decrease of both the static and pumping water levels indicates a receding water table. With indications of trouble, such as well screen clogging, revised pumping procedures should be started. Recommendations of authorities in the field of well screen maintenance include a reduced pumping rate at the first sign of screen clogging. Continued high pumping rates will only aggravate the clogged condition.

In summary, the well screen is presently being manufactured with the best methods and materials available for the conditions to be met. Well drillers have devised means for installing properly the well screen, for developing the well and for treating the screen and well to restore yields. The great need is for an increased collection and use of well performance data by the operators. Full cooperation by the various groups and individuals concerned will insure maximum service life from this most essential link, the well screen.

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APWA News

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Infiltration into Sanitary Sewers

Committee of the Northern California Chapter Reports on Investigations, Recommends Inspection Manual

SEVERAL months ago a committee was appointed by the President of the Northern California Chapter of the APWA to investigate the problem of ground water infiltration into sanitary sewers. The report of this committee, which was headed by H. A. Knudsen, Manager of the Sewage Disposal Division of the East Bay Municipal Utility District, was presented at the Chapter's June meeting in Oakland.

The Committee called attention to the fact that the quantity of ground water that can be tolerated in a sanitary sewer system is a problem in economics. "As the permitted quantity is increased," the report said, "it is necessary to increase the size of the sewer pipes and treatment facilities. The cost of power in systems requiring pumping is likewise increased. Conversely, as the limits on infiltration are tightened, the costs of sewer construction may increase. These two cost variables tend to cancel each other, and at some point the over-all costs approach a minimum."

Highlighting the report were two important recommendations. One was that the term "gallons per day per inch of internal diameter per thousand feet of sewer" be adopted as the standard unit of measure for expressing infiltration into sewer systems. The second was that the maximum rate of infiltration be fixed at 100 gallons per day per inch of internal diameter per thousand feet of sewer. For pipe 12 inches in diameter and smaller, a flat rate of 1,200 gallons per 1,000 feet per day was suggested.

The report includes a discussion of the factors or causes that contribute to the infiltration of ground water into sewers. These were divided into two groups. The first group called "Site Factors," are determined by the prevailing conditions in the area to be sewered. These include (1) Location of sewer; (2) Size of pipe; (3) Length of sewer; (4) Number and size of side connections; (5) Number and size of manholes; (6)

(*Continued on page* 112)

Urban Transportation Committee Meets in Chicago

The National Committee on Urban Transportation, which was organized last year, recently met in Chicago to receive progress reports from its nine Sub-Committees. Glen C. Richards, Commissioner of Public Works of Detroit and Chairman of the National Committee stated that he is extremely pleased with the preliminary drafts of the manuals which were submitted by the Sub-Committees. These manuals, he pointed out, contain suggested standards for auto and truck facilities and service; suggested procedures for the collection of street inventory data, and suggested standards and procedures covering other facets of the subject. The recommendations presented in these manuals will be put into effect on a trial basis in several pilot cities. The standards and procedures developed will then be reviewed and modified where necessary in light of the experience gained from the field trials. The final documents will contain practical and authoritative recommendations concerning the many inter-related aspects of the problem. Those in attendance at the meeting are pictured herewith.

President
Warren A. Coolidge

Vice-Presidents
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Kenneth K. King Albert G. Wyler

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REPRESENTATIVES from many organizations meet to consider urban transportation.

Dodson's Digest

George Jackson finds a new use for Calcium Chloride

Stopped off on my last trip upstate to visit George Jackson. George is in charge of maintenance at one of the state parks.

I had given him some advice on dustproofing with Calcium Chloride the last time I was there, so I wasn't surprised when he said:

"Dod, I'll bet you a hot dog you can't find any new uses for Calcium Chloride in the park today."

"You're on," I agreed, and we drove off.

When we turned off the highway, and onto the dirt road leading into the park, the car failed to stir up any dust.

"Got you there," George said. "We keep our roads smooth and dust-free with Calcium Chloride."

I didn't see any dust in the parking lot, either.

"Dust on cars is a nuisance," George observed. "Calcium Chloride helps us avoid that problem."

We parked the car and walked over to one of the baseball diamonds just in time to see a player slide into third in a cloud of – nothing!

"Our umpires call the plays right," George said. "No dust to obscure their vision, thanks to Calcium Chloride."

In the adjoining clay tennis courts, the players were working up quite a bit of perspiration, but no dust.

George grinned triumphantly. "We protect the health of our players and spectators . . . "

"I know – with Calcium Chloride," I finished up for him.

As we walked up to the refreshment stand, a boy on a bicycle suddenly skidded to a halt on the gravel next to us.

Looking up, I saw George standing in a cloud of dust. He didn't say a word . . . he just reached for his wallet.

– L. D. Dodson

P.S. — Our leaflet, "Wyandotte Calcium Chloride for Dustproofing," gives advantages and methods of using Calcium Chloride on many surfaces. To get your free copy, just drop me a line. *Wyandotte Chemicals Corp., Wyandotte, Mich. Offices in principal cities.*

Wyandotte
CHEMICALS
HEADQUARTERS FOR CALCIUM CHLORIDE

North Carolina Members Organize New Chapter

Various members of the Association residing in North Carolina have, from time to time, expressed an interest in organizing a State Chapter in order to further promote the aims and objectives of the APWA. J. B. Lambeth, Chief Engineer of Raleigh recently decided to get the ball rolling, so to speak, and invited all interested members to sign petitions for the establishment of a State Chapter. He was pleasantly surprised to receive signed petitions from over eighty percent of the members, thus indicating a strong desire to establish a new Chapter. The Association's Board of Directors has since approved the proposed By-Laws of this—the twenty-second Chapter of the APWA. A Temporary Committee, consisting of Mr. Lambeth; H. W. Kueffner, Director of Public Works of Durham and W. M. Garrison, City Engineer of Burlington, has been appointed by President Warren A. Coolidge, to make arrangements for the inaugural meeting of this new Chaper.

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Report on Infiltration

(*Continued from page* 111)

Kind or type of soil in which the sewer must be installed; and (7) Depth of sewer below the water table. The second group, termed "Construction Factors" which are controllable within limits, were listed as follows: (1) Engineering; (2) Structural stability; (3) Material of which the pipe is made; (4) Number and spacing of joints; (5) Type of joints; (6) Type and construction of manholes; (7) Construction of side connections; (8) Width and depth of trench; (9) Bedding or other support for pipe; (10) Backfill and removal of sheeting; (11) Workmanship; and (12) Inspection.

Suggested specifications limited to those provisions considered pertinent to infiltration, are contained in the report. The Committee recommended that the following items be included in the specifications and drawings: (1) Depth of trench at all locations; (2) Maximum width of trench that will be permitted for each size of pipe and depth of trench; (3) Soil types that will be encountered, with location of each. [If borings have been made, include a map and data obtained at each location. Do not attempt to interpret this data in the specifications, but present it is such a manown evaluation. To avoid controner that bidders can make their versy during construction it is well to state the source of information upon which the data is based and that it is offered for the bidders' guidance only and is not guaranteed to be exact as to detail]; (4) Type and extent of bedding required for each condition; (5) Type and location where cradle or concrete encasement will be required; (6) Location and number of piles, if required; (7) Method of laying pipe; (8) Method of backfilling and removal of shoring and (9) Permissible maximum rate of infiltration for each size of pipe.

The Committee also recommended that a sewer inspection manual be prepared in order to help public works officials control the problem of ground water infiltration into sanitary sewers.

• • •

Vincenz Heads Resolution Committee

Jean L. Vincenz, Director of Public Works for San Diego County, California has been named Chairman of the 1955 Resolution Committee which was recently appointed by President Warren A. Coolidge. Other members of the Committee are Charles Cassgne, Jr., Administrative Engineer of the Railroad Terminal Board of New Orleans; C. Madison Williams, Commissioner of Streets, Topeka, Kansas; and Andrew F. Eschenfelder, Borough Engineer, Glen Ridge, New Jersey. The President of the Association also serves as an ex-officio member of this Committee.

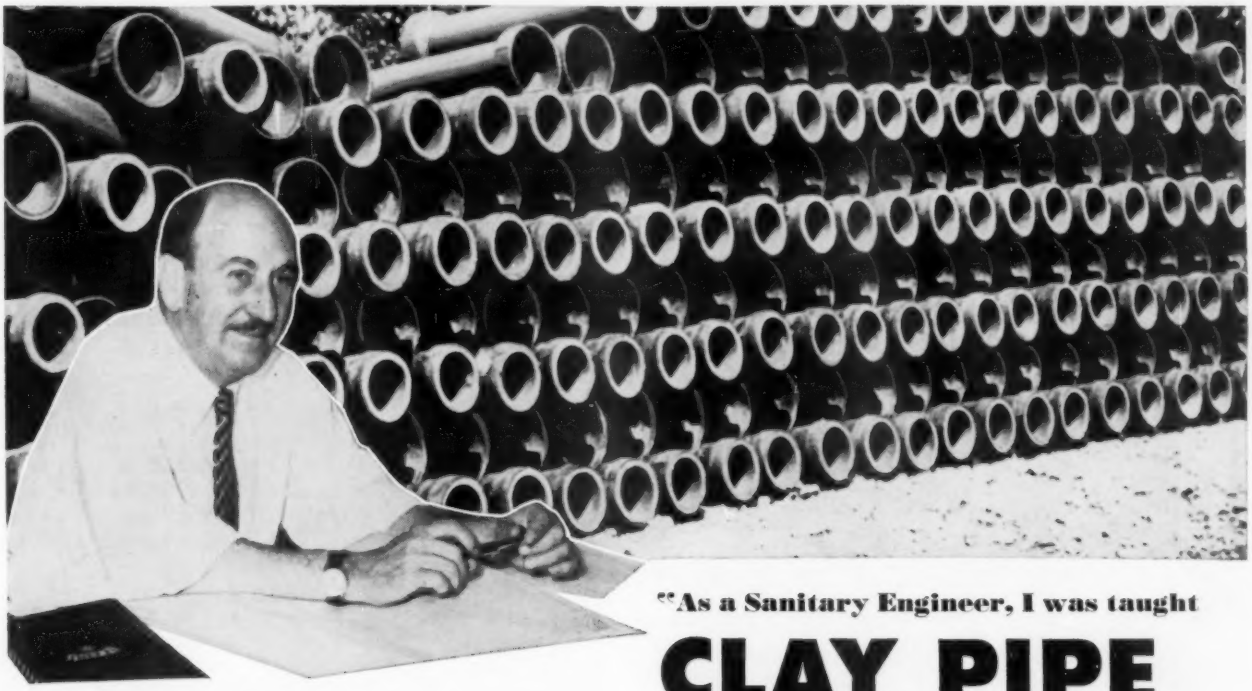
All resolutions that are to be presented at the annual business meeting to be held in the Milwaukee Auditorium, Monday morning October 3rd, must first be referred to the Resolutions Committee. No action can be taken on a resolution without a previous report on it by this Committee. Proposed resolutions may be submitted to any member of the Committee.

• • •

Five Chapters Elect New Officers

New Officers were elected to head five Local Chapters during the past few weeks. The new slate named by the **Philadelphia Chapter** consists of: R. B. Terry of the Philadelphia Electric Company, President;

(*Continued on page* 157)



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—GILBERT T. JEROME, *President of George Jerome & Co., Detroit's oldest business firm and one of the oldest engineering organizations in the nation.*

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"I was taught Clay Pipe in school," says Gilbert Jerome. "I'm a sanitary engineer, and I believe in it."

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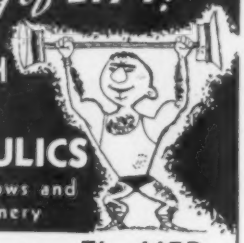

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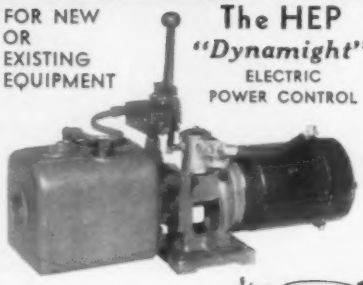

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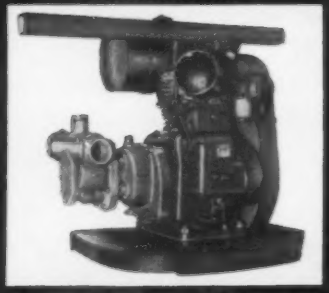

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Washington news

Presented in cooperation with the American Public Works Association and through the courtesy of the Washington Office of the American Municipal Association.

Intergovernmental Relations Commission Reports Findings

A number of significant recommendations were included in the 311-page report which was recently submitted to the President by the Commission on Intergovernmental Relations. The 23-member Commission headed by Meyer Kestnbaum, of Chicago urged the States to take full advantage of their existing tax powers and to grant increased home rule to their cities.

"The fundamental objective of our system of government', the report said, 'should be to keep centralization to a minimum and state-local responsibility to a maximum."

The majority of the Commission favored pay-as-you-go rather than bond financing of the expanded highway program. This latter plan, which was originally proposed by the Clay Committee, has been endorsed by the President. Additional funds for the road program should be raised primarily from increased motor fuel taxes according to the report. The Commission also called for less Federal supervision of the highway grant-in-aid program. Other recommendations of special interest to public works officials may be summarized as follows: (1) The federal government should begin the practice of making payments in lieu of taxes to state and local governments, for federal property which has been stricken from the tax rolls; (2) The federal government should stimulate airport development on a regional basis and continue federal aid for airport construction; (3) Responsibility for the initiation and administration of public housing, slum clearance and urban renewal program rests primarily with state and local governments. The federal governments should, however, continue to provide technical and financial assistance in this field. (4) The federal government should be responsible for the overall planning and direction of Civil Defense programs, while state and local governments should be responsible for the adaption of national policies to local situations. (5) A Board of Coordination and Review should be established to advise the President and the Congress on a coordinated natural resources policy within the federal government and between it and the states. Each state is urged to establish a similar body or to designate an existing agency to coordinate its policies and to facilitate cooperation with the federal government. (6) Capital costs of multipurpose, basinwide water resource developments should be equitably divided between the federal government and the states concerned, in the light of benefits received, ability to pay and other attendant circumstances. (7) States and municipalities should give increased attention to unifying their community services through the creation of metropolitan planning authorities. States should provide technical and financial assistance where the locality is not able to meet its own planning needs. (8) A Special Assistant in the Executive office of the President should be appointed as an adviser to the President on State and local relationships. An Advisory Board on Intergovernmental Relations should also be appointed to aid in the development of federal policies affecting state and local governments and to assist administrators in harmonizing their decisions and working relationship at each level.

Increased Use of Revenue Bonds

Senator John W. Bricker of Ohio recently introduced a bill (S.2290) which is designed to permit national banks to underwrite certain securities issued by State and Local governments. Advocates of this bill contend that it will broaden the market for public securities and will therefore result in lower interest

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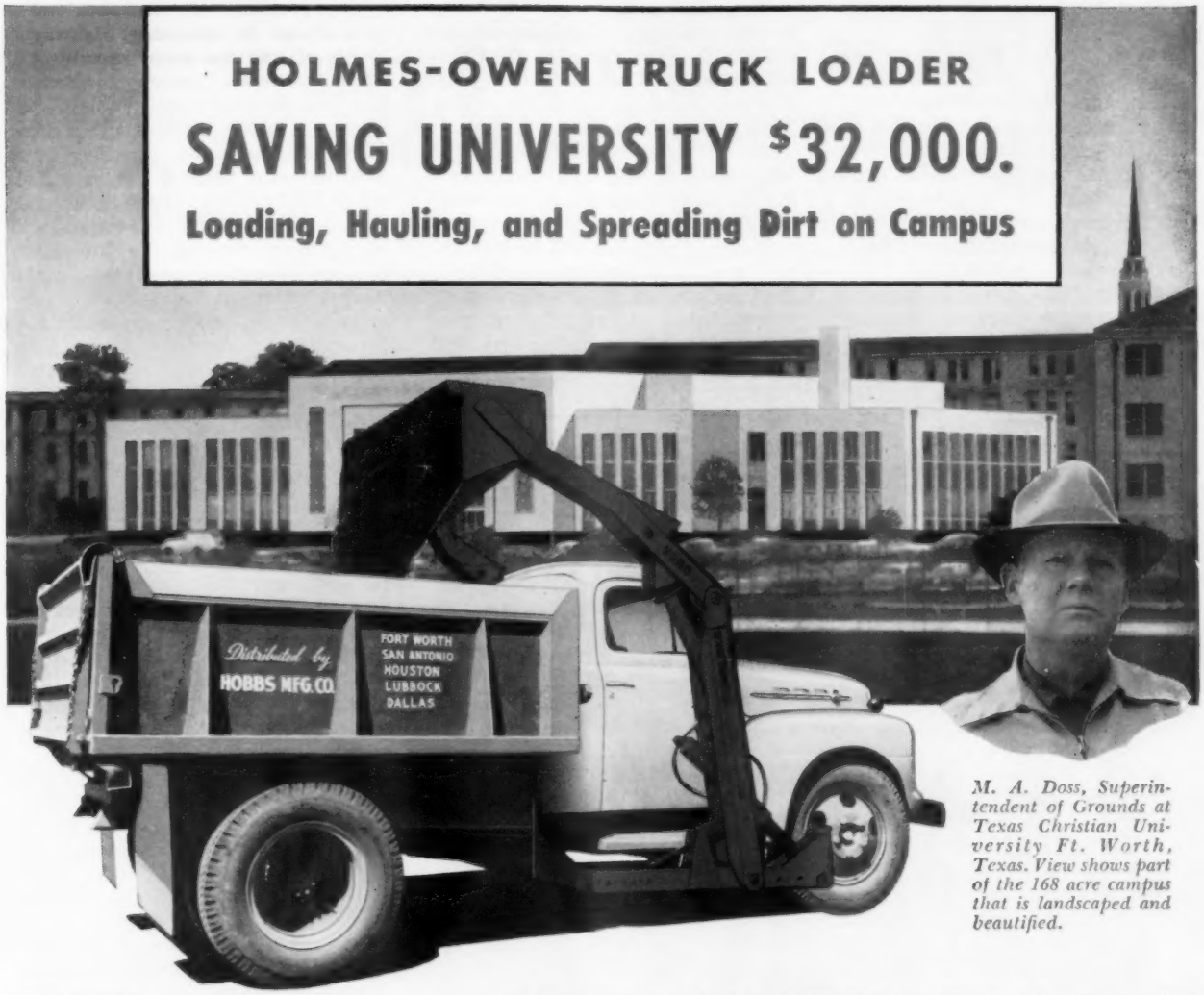

M. A. Doss, Superintendent of Grounds at Texas Christian University Ft. Worth, Texas. View shows part of the 168 acre campus that is landscaped and beautified.

"SAVE 80% on COST of DIRT MOVED"

75% REDUCTION in LABOR

Texas Christian University is one Institution that not only teaches Economics but puts these principals into practice in landscaping and beautifying their campus. Through the purchase of a Holmes-Owen Truck Loader, the University has reduced the cost of moving dirt from 75¢ per yard to 15¢ per yard. A full 80% reduction that will save the University $32,000, according to M. A. Doss, Superintendent of Grounds. Here's how he arrives at that figure.

"Minimum requirements for leveling, fertilization and beautifying the campus calls for 4,800 yards of dirt per year. Privately contracted for, this dirt delivered but not spread, would cost at least $1.50 per yard, or $7,200 per year. During the past four years it has required three men and a driver to haul and spread 24 yards in one day, at an average cost of 75¢ per yard. Since the acquisition of a front end loader that permits one man to Load, Haul and Spread we have averaged moving 35 yards per day, at a cost of about 15¢ per yard. Figuring the original investment (truck and loader at $5,000), the driver's salary, gas and oil at $3,500 per year, with complete depreciation of equipment in 10 years . . . it'll cost $32,000 less than it would if we had contracted for the same work" reports Mr. Doss.

Holmes-Owen Truck Loaders are today substantially reducing the cost on many such jobs for various types of users including: Railroads, manufacturers, ranchers, contractors, states and municipalities. Write today for details on how to reduce cost with a Holmes-Owen Loader.

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rates for State and Local governments.

The National Bank Act, as amended in 1933 and thereafter, authorizes banks to underwrite and deal in general obligation bonds which are secured by ad valorem taxes on real property. The bill proposed by Senator Bricker would permit national banks also to underwrite and deal in revenue bonds. Totals compiled by the *Daily Bond Buyer* shows that there is a marked trend toward the use of revenue bonds for financing public improvements.

No action is expected to be taken at this session of Congress on this bill which was referred to the Committee on Banking and Currency. However, the increased rate of expenditure for state and local public works improvements during the next few years will undoubtedly result in a continuation of the trend noted above. It is therefore expected that strong pressure will be brought to bear at the next session of Congress to amend the present law to permit bank underwriting of revenue bonds issued by State and local governments.

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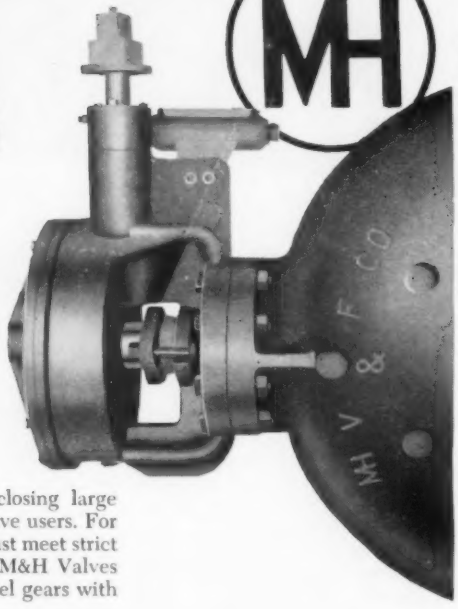

Use of gears for opening and closing large valves is a growing trend among valve users. For satisfactory operation, such gears must meet strict engineering standards. That's why M&H Valves are equipped with high strength steel gears with cut teeth.

Either bevel or spur gears can be furnished for both NRS and OS&Y Valves. Gears are mounted either with open bracket or enclosed outside-packed gear case. Non-rising stem, bevel and spur geared valves are available with worm gear indicator to show when the valve is closed, partly open or fully open. Internal working parts of the indicator are bronze. For details, wire or write M&H VALVE AND FITTINGS COMPANY, Anniston, Alabama.

M&H PRODUCTS FOR WATER WORKS • FILTER PLANTS INDUSTRY • SEWAGE DISPOSAL AND FIRE PROTECTION

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Improvement of methods and procedures in obtaining highway rights-of-way has been the subject of considerable activity in state legislatures this year. Federal-aid highway legislation passed by the U. S. Senate grants the Secretary of Commerce authority to contract up to $100 million for the fiscal year ending June 30, 1956 for acquisition of rights-of-way on the Interstate System when states request assistance because of inadequate laws to acquire such lands with sufficient promptness. Other highway bills pending in Congress contain similar provisions.

A new Washington law authorizes the filing of descriptions and plans of highway location, widths and lines with the county auditor, and thereafter, the owner or occupier of such lands shall make no improvements within the limits of any such highway. Another law authorizes the State Highway Commission to secure options on property needed for state highway rights-of-way for an entire project or section thereof for review by the Commission before final adoption or acquisition.

The Wisconsin legislature has passed a bill authorizing the Milwaukee County Expressway Commission to acquire land which is expected to be needed for freeways at some future date. A $5 million fund is created to buy such land. The commission is also empowered to lease any land it may purchase until it is needed for construction. Another major feature of the new bill, which is expected to be signed by the Governor, permits the Commission to acquire air rights that would be needed for structures to carry freeways over existing buildings or lands.

Planning commissions of Ohio municipal corporations and counties would be authorized by pending legislation to establish mapped street line and road line plans in the master plan. After the adoption of any such plans by county or municipal authorities, all applications for building permits within the mapped street lines shall be referred to such authorities, who shall within 60 days initiate proceedings to acquire the property, obtain an easement to prohibit building within the proposed right-of-way, or direct the building permit officer to issue the permit.

Other legislation for improvement of methods for acquisition of highway rights-of-way were proposed in Connecticut, Delaware, Louisiana, New Hampshire and Texas.

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Ground Water Recharge Operations

An abstract of a paper by W. H. Sisson, Construction Engineer, Upjohn Co., Kalamazoo, Mich., presented at the recent AWWA Convention.

WATER CONSERVATION was given much consideration in the design and construction of the 2,000,000 sq. ft. manufacturing plant of the Upjohn Company, recently completed in Kalamazoo, Michigan. The average volume of 6.5 mgd of water comes from wells. After flowing through air-conditioning coils, approximately 50 percent of it is reused for condenser water, vacuum stills, product cooling, and roof sprays. Some water is reused for the fourth time in irrigating 22 acres of lawn. Last year, after some experimenting, it was found possible to save over 0.5 mgd by exhausting some vacuum jets directly to the atmosphere rather than condensing the vapors with water.

Further to conserve water, although ground water is plentiful at the plant site, work was started in the fall of 1952 to determine if a recharge pond operation would be practical. A 10,000-sq. ft. area of ground that could be filled by gravity with clean, warm waste water was diked off; fourteen 2-inch observation wells were drilled in four directions and at various distances from the pond; an 8-inch filling line was installed and the area filled with 3 ft. of water. Static water level and water temperature data from the pond and observation wells were tabulated daily for almost two years.

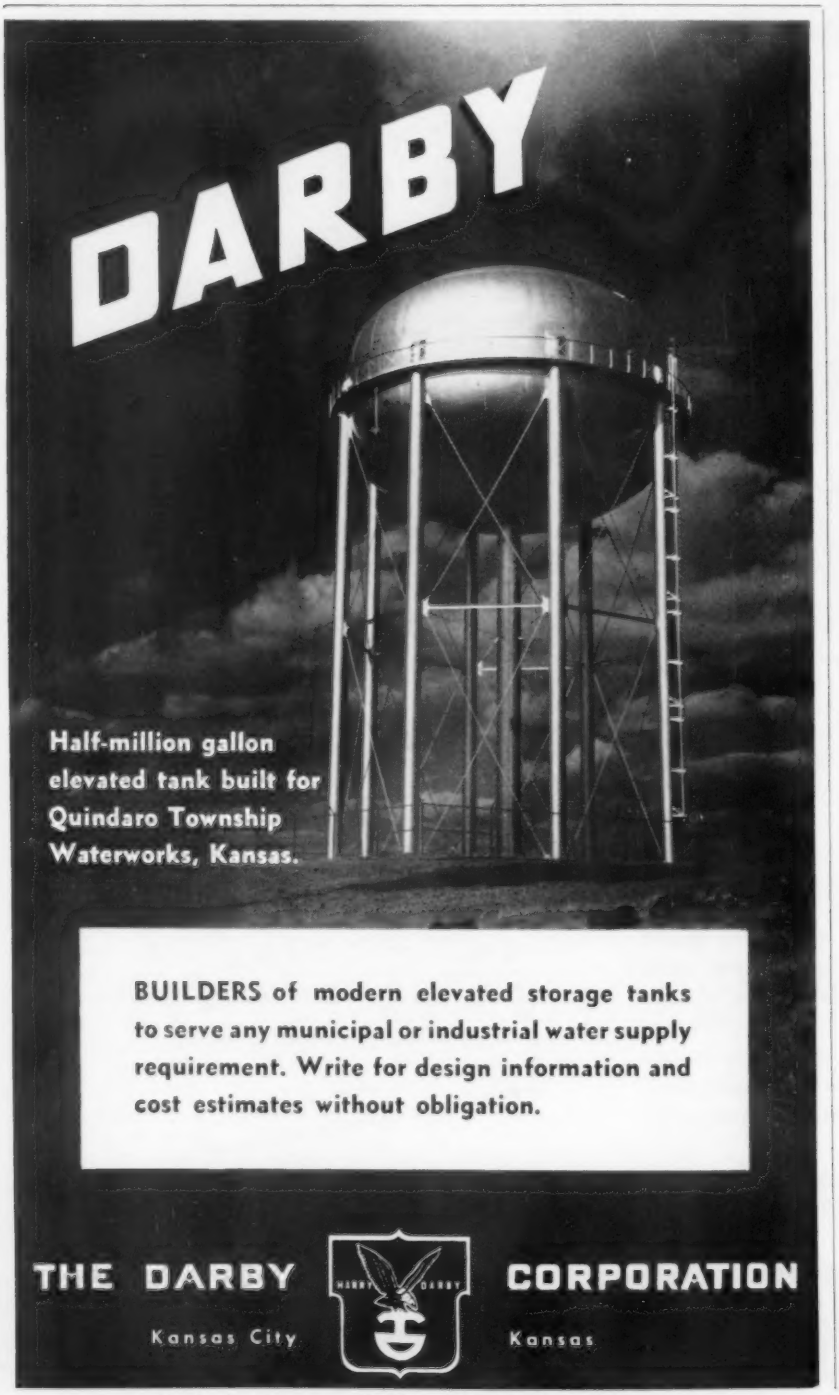
A percolation rate of 115,000 gpd was determined for the area. The average temperature of the waste water going into the pond was 73°F. It was found that the water cooled to the normal 52°F ground water temperature at the rate of 1°F in 19 ft. of travel By observing the temperature curve crests at various distances from the pond, it was determined that the water was traveling underground at the rate of 1.75 ft. per day.

By plotting the static water level readings from the observation wells on opposite sides of the pond, the resulting "Inverted Drawdown Curve" indicated the slope of the water table. It was noted the table sloped at a 0.1 percent grade toward the company's pumping wells 1/3 mile to the east, and at a 0.079 percent grade toward the city's pumping wells 2 miles to the north.

Inasmuch as the experimental pond proved that the recharged water was flowing back to the company's wells, that the water was again cooled to normal well water temperatures, and that the percolation rate was acceptable, it was decided to enlarge the pond in September, 1954, to a 50,000 sq. ft. area.

A 90-acre pond area on another side of the plant property is used as a natural recharge area. The pond was handling 1.5 mgd but until the fall of 1954 was badly polluted with wastes from the production of fine chemicals. During the summer of 1954, primary treatment facilities and two 1,500-foot deep brine strata rock disposal wells were installed to pump this strong waste into the ground safely away from the potable water.

With the natural pond recharging 16 percent of the water and the artificial pond recharging 9 percent, a total of 25 percent of the pumped well water is being returned to the earth.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Hydraulic Research on Storm Drainage

From the Excellent Report of

LLOYD ALDRICH,

City Engineer, Los Angeles, Calif.

THE adoption of the Los Angeles County-Wide Flood Control District Storm Drain Program involving the ultimate construction of several thousand new catch basins throughout various portions of the City of Los Angeles gave rise to the need for improving catch basin hydraulic characteristics and revising the standard plans pertaining to catch basins which, in most particulars, have been adopted as standards of the Flood Control District. The need for new and more hydraulically efficient basins was increased by the practical demand of eliminating local depressions from the roadway surface, particularly on major traffic streets, in order that the full width of roadway might be safely and comfortably used for moving traffic during peak hours.

This study was assigned to the Hydraulic Laboratory Section of the Storm Drain Design Division, and the initial work was started immediately prior to the beginning of the past fiscal year. A model of a typical half-width street, 60 feet in width with a 40-foot roadway on a model scale of 1:5, was constructed for this purpose. The model was adaptable to varying the rate of grade or slope, the crossfall, and the catch basin dimensions. In order to keep the experimental work on a practical basis and minimize, as far as possible, pure hydraulic theory, initial studies were made on a model of a standard seven-foot catch basin with local depression, and the capacities of this basin were determined under varying conditions of street slope.

The second phase of the study was to determine the loss of efficiency of the existing standard catch basin design by comparing the intake quantity through the catch basin inlet opening with the intake quantity through an indentical curb opening without the detrimental effects and losses which occur within the basin itself. This study indicated the maximum degree of efficiency which might be expected from a standard seven-foot basin with local depression, in which all losses within the basin and the connecting pipe had been eliminated.

The third step in the study was to develop both a new type of curb inlet (without local depression) and a new type and shape of catch basin proper in which the known losses were reduced to a minimum. This study resulted in a modified design of curb inlet opening and basin shape with an improved outlet transition between the catch basin and the connecting outlet pipe. These studies also indicated that under certain conditions the capacity of the basin was being limited by the inadequate capacity of the connecting pipe between the basin and the main storm drain.

Subsequent studies, using the improved catch basin design, involved catch basin openings of various lengths from 10 feet to 50 feet and also encompassed the study of the efficiency and effectiveness of multiple catch basins as contrasted to larger single opening structures.

Additional studies to be undertaken during the early part of the present fiscal year will be made of catch basin openings under sump conditions. All of these studies should prove to be of real value to the City in the design of future storm drains involving catch basin facilities. In fact, this study has appeared to be of such value to the Los Angeles County Flood Control District that a contract has been prepared under which the District will contribute the sum of $5,000 toward financing experimental work.

Recent bids received by Los Angeles have indicated that the new basin and curb inlet can be constructed within the same cost limits as prevail on our existing standard basins. The work, therefore, gives promise of increased efficiency of street surface use and of storm drain facilities without increased cost.

Rainfall-Runoff Studies

One of the least known but highly important phases of the work of the Storm Drain Design Division is the collection and dissemination of rainfall-runoff studies. While this work is confined to the geographical limits of the City, it is supplemented by similar work largely undertaken and maintained by the Los Angeles County Flood Control District, with which organization a close degree of cooperation and interchange of information is maintained. Additional information of this nature is furnished by the U. S. Corps of Engineers.

Nine drainage areas located in both the urban and mountainous regions of the City have been equipped with automatic rain gages, automatic stage recorders, and/or manually operated standard rain gages. The rainfall records from the mountainous areas, obtained from sites well distributed over the Santa Monica Mountains, are used to evaluate the varying rates of runoff from the many canyons whose storm water flows pass through lower well-developed urban areas. The runoff from other drainage areas, both urban and mountainous, are recorded by the use of staff and stripe gages, the former being located in streets and open streams, while the latter are located in closed storm drains. These gages rely upon a readily soluble yellow dextrine which is dissolved and washed away during the passage of high water, leaving the record of the highest elevation which the storm water reached in either the street, stream, or storm drain. The runoff from a number of more important drainage areas which is now confined to a closed drain is recorded and accurately measured by automatic stage recorders located adjacent to specially constructed channels.

The work of servicing, repairing, and reading nine automatic stage recorders, fifty-four high water gaging stations, and thirty-four standard and automatic rain gages, together with the assembly and analysis of the data obtained therefrom, is an important function of this Division.

While the rainfall for the past season was subnormal, an unusually heavy storm covered the U.C.L.A., West Los Angeles and Rustic Canyon areas on February 13-14, 1954 which gave precipitation in excess of a 50-year frequency at certain of the gages in the area for periods of one hour, two hours, and three hours duration. Fortunately, the area affected by this intense rainfall was relatively limited, with the result that excessive damage was not experienced.

• • •

Subdivision Regulation

New subdivisions taken into Colorado Springs, Colo., must set aside 8 percent of their land for school or park purposes. Previously, subdividers were required to set aside 5 percent of the area for such purposes.

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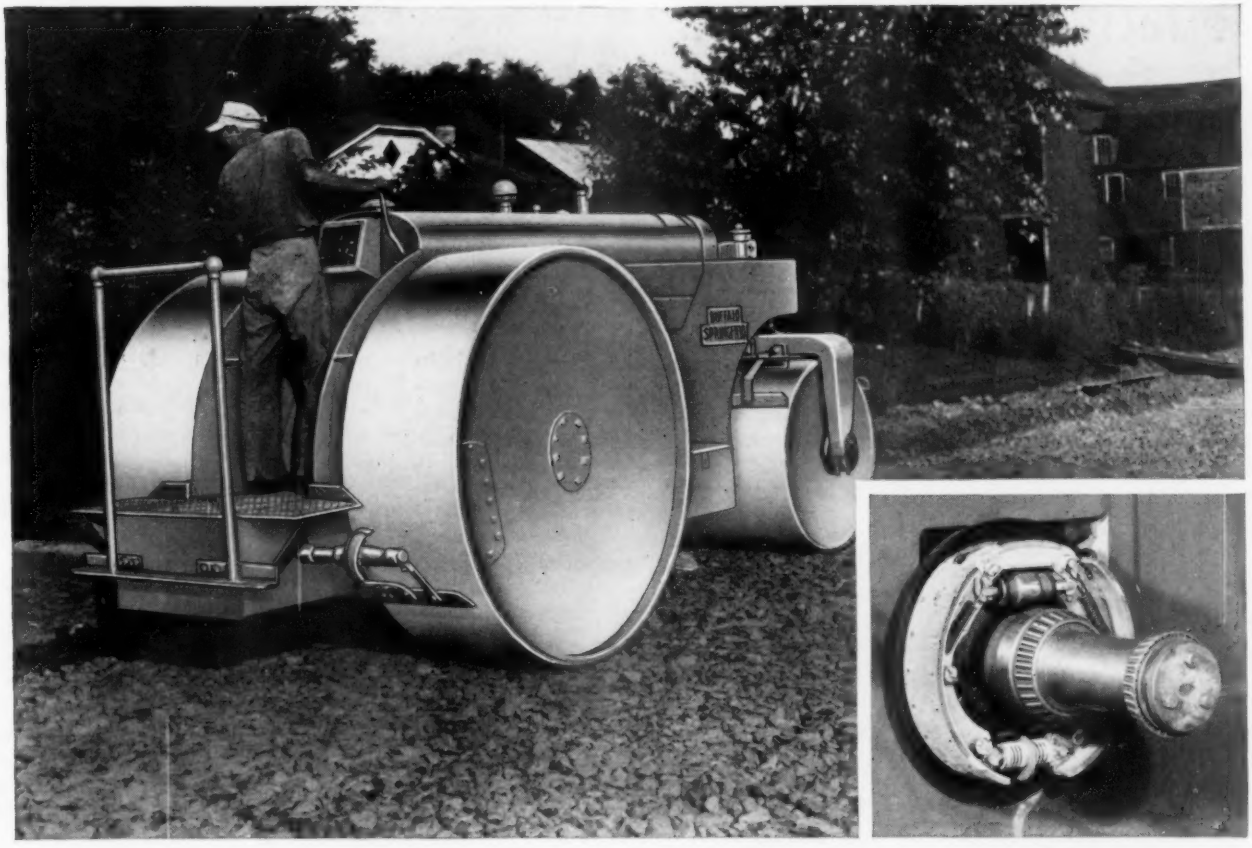

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PUBLIC WORKS DIGESTS

The INDUSTRIAL WASTE Digest

Review of Literature on Waste Treatment

That portion of the Critical Review of the Literature of 1954 dealing with the treatment of industrial wastes, prepared by a committee of the Federation of Sewage and Industrial Wastes Association, includes references to 258 articles and reports. It discusses: Cannery wastes, treatment and recovery; corn and sugar processing; dairy wastes; packinghouse wastes; fermentation industries; chemical wastes; textile wastes; wool scouring; tannery; pulp and paper wastes; petroleum processing; steel production; pickling and acid wastes; plating and cyanide wastes; coal wastes; and by-product coke wastes.

"A Critical Review of the Literature of 1954 on Sewage, Waste Treatment, and Water Pollution." By The Committee on Research, FSIWA. *Sewage and Industrial Wastes*, June.

Recovering Caustic in a Bleachery

In a bleachery performing the operations of desizing, mercerizing, and bleaching, usually 80% of the caustic that goes into that operation is not consumed. This waste caustic contributes to high pH and waste treatment problems. A mill in Virginia has installed a system which recovered 3,500 tons of caustic soda the first year. The cost of the recovery facilities was $200,000, and operation savings repaid this expenditure in the first year. The mill also improved the quality and production of the cloth by improved washing on the tenter frame, where the caustic is recovered, as well as by partly eliminating shrinkage in the filling threads. The key to the problem is washing out the caustic on the tenter frame, to increase the caustic content of the wash liquor, to reduce its volume and to reduce simultaneously the content of caustic soda in the cloth leaving the tenter frame. If there is any caustic soda residue that cannot be used in dilute form, it can be concentrated in evaporators for re-use in mercerization. If the plow-back of strong caustic is too great for use in mercerization and plissé finishing, it may become necessary to remove impurities and produce highest purity caustic which can be used in a multiplicity of places.

vay Process Division, Allied Chemical and Dye Corp., Syracuse, N. Y. *American Dyestuff Reporter*, June

"Pollution Control by Recovery of Caustic Soda". By W. R. Steele, Sol-

High Rate Filter for Textile Waste

A laboratory pilot plant high-rate trickling filter was constructed for a flow of 50 to 150 gpd based on strength of waste to be treated. The filter was 15″ terra cotta pipe, 4′ long with filter media of granite chips 1½ to 3½″ dia. Total volume of stone was 4.88 cu. ft. Recirculation rate was held at 2 to 1. The plant was started on raw sewage and operated for 29 days to allow development of filter growth. A mixture of textile mill waste was then added in gradually increasing amounts with a corresponding decrease in the amount of sewage. It was predetermined that a ratio of 40% millwaste to 60% sewage was desirable since this was the approximate ratio for the installation under consideration. The pilot was started on 40% mill waste and 96% sewage and gradually altered until the 40-60% ratio was reached. After the flow was increased to 125 gpd it was still necessary to acclimate the filter to the higher pH; since the pH had been controlled at 8.2 until the 40-60% ratio was reached. The plant was operated on the 40-60% ratio at 125 gpd and pH 8.2 until fully acclimated. Then the pH was gradually increased until no pH adjustment was necessary. Results disclosed that biological treatment of highly alkaline mill waste up to a 40-60% mixture, with no chemical pretreatment, was quite successful with BOD removals in the 70% range. The pH of the mixture was reduced from 10.0-11.4 range to 7.9-8.5; suspended solids removal about 55%. The critical pH appeared to be between 11.3 and 11.4 at which point the efficiency dropped sharply but recovered in 3 days on normal waste and sewage.

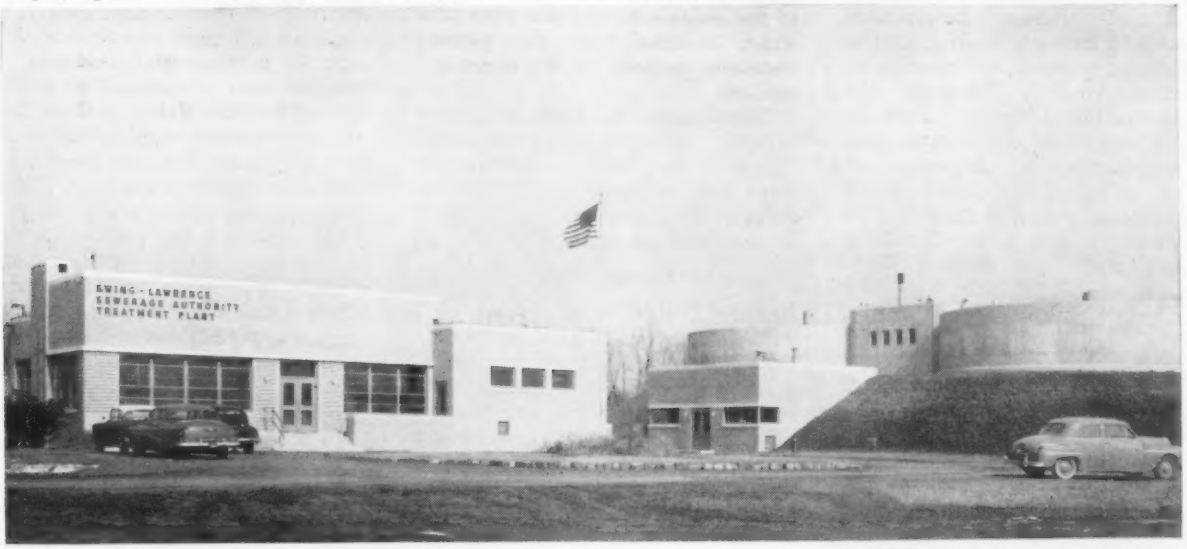
General conclusions were: 1) With the 40-60% ratio of mill waste: sewage; (a) efficiencies of about 93% removal of BOD through high-rate and activated sludge units; no sulfide odors; (b) efficiencies of about 73% BOD removal at influent pH of 8.5 and 58% BOD removal at influent pH 10.5 through trickling filter and settling only. 2) Extreme care in gradually acclimating the filter and activated sludge to highly alkaline waste is required for successful treatment. 3) Efficiencies above 90% removal of objectionable organic-odor-producing substances are obtained up to pH 11.4. 4) Good color removal results were obtained in treating the 40-60% ratio mixture. 5) No odor in final effluent. No odors were noted at the various units of the treatment plant, probably due to the fact that pH of the 40-60% mixture never dropped to 7.0 or below.

"Biological Treatment of Mixtures of Highly Alkaline Textile-mill Waste and Sewage," by R. Hobart Souther and Thos. A. Alspaugh, Cone Mills Corp. Greensboro, N. C. *American Dyestuff Reporter*, June 6.

Chemical Industries Work for Pollution Abatement

Chemical companies are spending more than a million dollars a year in research to study the nature of air and water pollution and processes for minimizing pollution. They are spending at least ten million dollars annually to install new devices to abate pollution in older plants and to operate existing equipment. Through the Air and Water Pollution Abatement Committee of the Manufacturing Chemists Association it is working closely with other industries and regula-

Right, digester control building and two 50′ digesters with PFT Floating Covers



At Ewing-Lawrence, New Jersey...

Townships consolidate for modern sewage treatment

5 MGD PLANT ADOPTS PFT "CONTROLLED DIGESTION"

Ewing and Lawrence Townships abandoned their septic tanks in 1953 for a high rate trickling filter plant and complete, effective treatment. Designed for a population of 40,000, the plant will treat an average of 5 MGD in domestic and industrial wastes.

To accelerate digestion and simplify operations, a complete "Controlled Digestion" system was installed consisting of these items of PFT equipment:

Two *PFT Floating Covers* for the 50′ digesters to provide positive scum submergence and flexible operation.

A *PFT Heater & Heat Exchanger* to maintain optimum temperature in the digesters at all times.

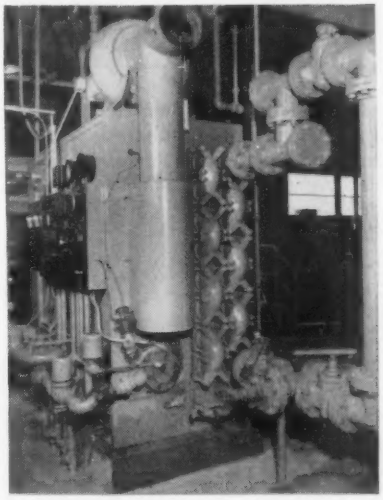
Two *PFT Supernatant Liquor Selectors* (with Gauge, Sight Glass & Sampler units) for automatic withdrawal of the best digester liquor.

Two *PFT Cover Position Indicators* to tell the operator at a glance the position of the Floating Covers.

PFT Waste Gas Burner to burn off excess gas safely and avoid odor nuisance.

A complete set of *PFT Gas Safety Equipment* for maximum protection against fires and explosions.

Both the plant and the sewerage system were designed for considerable future expansion. Congratulations to Ewing and Lawrence on their excellent new facilities and far sighted planning!



PFT Heater & Heat Exchanger unit (500,000 B.t.u. per hr.) in the digester control building

Design of plant by / *Buck, Seifert & Jost, New York, N. Y.*

waste treatment equipment exclusively since 1893

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tory officials toward the solution of regional problems. The chemical industry is taking a leading part in exchanging technical information on pollution control. Through the Manufacturing Chemists Association it sponsors conferences and issues informative publications on recent technical developments in all phases of pollution control.

"Process Wastes from Chemicals Manufacture." By George F. Jenkins, Carbide and Carbon Chemical Co. *Sewage and Industrial Wastes,* June.

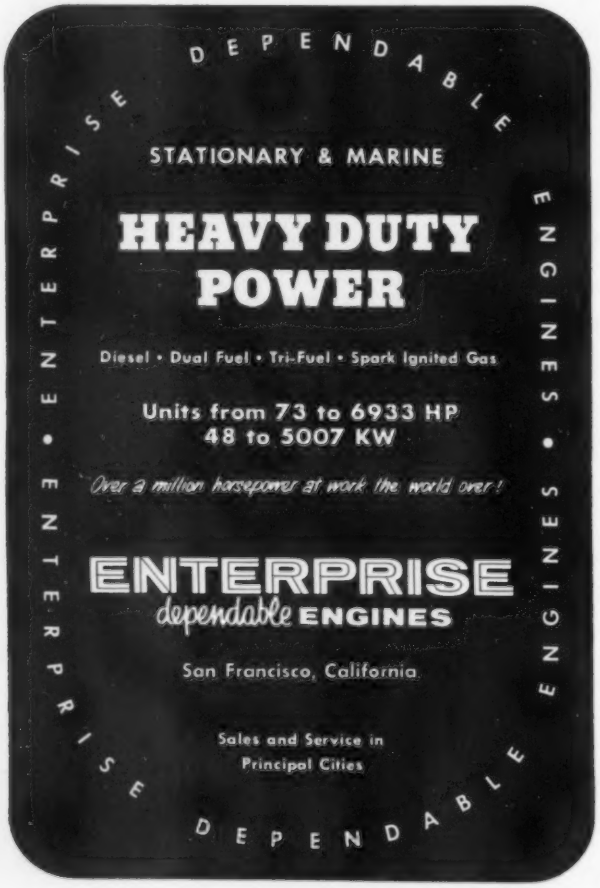
Alcohols in the Activated Sludge Process

Study has been made at the Massachusetts Institute of Technology to furnish basic information on the metabolism of the simple alcohols (one to four carbon atoms per molecule) by activated sludge. These indicated that acclimated activated sludge metabolized methanol rapidly and formic acid more slowly, but failed to metabolize formaldehyde. Findings concerning ethanol, isopropanol, 2-Butanol; tert-butanol and others are described. Metabolism of the synthetic organic compounds by the organisms contained in activated sludge appeared to be a function of the chemical structure of the compound and the ease with which it fitted into the general metabolic pattern of the micro-organisms.

"Metabolism of Low Molecular Weight Alcohols by Activated Sludge." By Ross E. McKinney, Ass't Prof. of San. Engineering, and John S. Jeris, Research Ass't, M.I.T. *Sewage and Industrial Wastes,* June.

Synthetic Compounds Reduce Pollution

The Crompton-Shenandoah Company has embarked on an abatement program, based upon long-term studies of the problem, which seeks satisfactory pollution abatement through "in-plant" process changes. The problem at this plant is similar to that of many cotton-dyeing and finishing plants which discharge their wastes from wet processes directly into relatively small streams. Initial studies of effluents from the various wet processes showed that a total BOD loading from the finishing plant averages 3,000 lbs./day, as follows: desizing-52.5% BOD load; dyeing-37.2% BOD load; and bleaching-10.3% BOD load. Pilot plant data indicated high-rate biological filtration (the most economical treatment method) would have about 75-80% efficiency. Full scale plant for 1.75 mgd was estimated to require a capital investment of $250,000 and an annual operating cost of $10,000. Hence if individual process wastes strength could be reduced by some 70%, the need for a treatment plant would be highly unlikely. The major source of pollution, the desizing process, is due to digested starch residues and must be approached from the standpoint of the slashing operation. It has been known for sometime that certain film-forming materials of a synthetic nature exhibit relatively low BOD values in comparison with natural sizing materials. It is possible to reduce the pollution stemming from the desizing process tremendously if the starch or starch derivatives could be replaced with one or more of the low BOD synthetics. Heretofore, the major drawback to the use of synthetics in cotton slashing has been the cost differential; but considering the waste treatment costs, it would seem logical that some material exerting low BOD could be found to replace starches and still maintain an economical balance in producing textiles.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FILTER BED AGITATORS

TECHNICAL ADVANTAGES

- 1—Requires an average of 40% less wash water
- 2—Completely eliminates mud balls
- 3—Eliminates cracking or shrinking of the beds
- 4—Produces "new" filter media after short period of normal operation
- 5—Turns out purer, better tasting water
- 6—Low installation cost
- 7—Low operating cost
- 8—More water through the filters
- 9—Less "time out" washing filters

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FAR SUPERIOR to Sand or Quartz Media, as it Double length of Filter runs, nearly halves wash water needs; with less coating, caking, or balling.

Filters are in service more as wash water cycle shorter. Better removal of bacteria, taste, odor. Increased Filter output, better effluent. Ideal for industrial acid and Alkaline solutions. Ask any user.

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for Valves, Floorstands and Sluice Gates

Floorstand equipped with Motor Unit . . . control panel, motor, limit switch and push button station.

Simple, durable mechanism of Chapman's Motor Unit. Handwheel remains stationary during motor operation.

Chapman Motor Units have fewer components than any other units, providing greater dependability, much lower maintenance costs.

There are only two pinions and two gears in the motor reduction train: drift is eliminated and lash is negligible. Your valves seat tight, but not too tight. Operation is *always* smooth and trouble-free.

You can mount the Chapman Motor Unit in any position, at any angle required. The rugged stub-tooth gears require no grease or oil bath . . . yet run smoothly, quietly, with minimum wear.

Weatherproof and steam tight, Chapman's floorstand units are shipped completely wired, ready to connect to your power leads, for easy, rapid installation. This modern motor unit is dependable and economical. Send for *new* catalog No. 51.

The CHAPMAN Valve
Manufacturing Company
INDIAN ORCHARD, MASSACHUSETTS

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TWO PIECE
sliding or screw type cast iron valve boxes for covering 4" through 10" valves for water or gas. Rugged construction for lifetime service. 5¼" shaft. Extensions as required.
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VALVE BOXES
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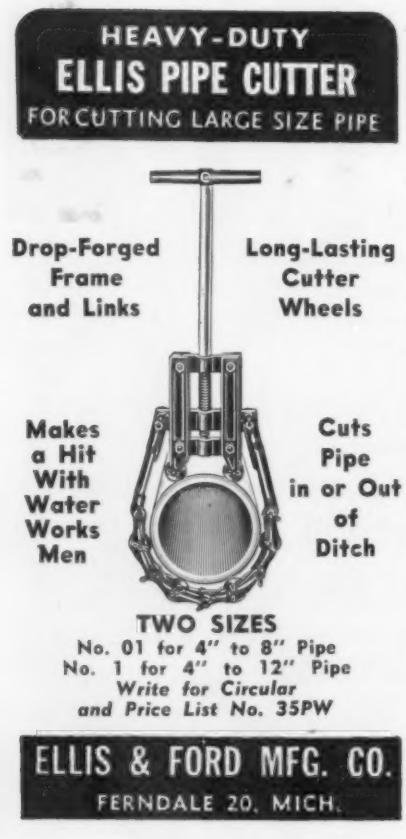
HEAVY-DUTY
ELLIS PIPE CUTTER
FOR CUTTING LARGE SIZE PIPE
Drop-Forged Frame and Links
Long-Lasting Cutter Wheels
Makes a Hit With Water Works Men
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After a search, carboxymethylcellulose (CMC), seemed to be the first most likely product for experimental work. Tests showed that using a size solution of 65:35 ratio of starch:CMC disclosed a lower solids add-on, only one half water and steam requirements, as well as the expected lowering of BOD. Actually about 95% reduction was obtained whereas a calculated reduction of about 67% was expected. Further experiments are being conducted to determine the reason for such a difference, as well as using other materials of low BOD values. In the dyeing process, substituting mineral acids for acetic acid in various processes is also being studied.

"Cotton Slashing with Synthetic Compounds as a Means Toward Pollution Abatement," by Duane W. Snyder, Crompton-Shenandoah Co., Inc., Waynesboro, Va. *American Dyestuff Reporter,* June 6.

A Forum Discussion Of Industrial Wastes

At the October meeting of the Federation of Sewage and Industrial Wastes Ass'ns, a forum was held to discuss disposal of industrial wastes, especially specifications in municipal ordinances, and whether and when it is preferable to dispose of wastes into a public sewer or into a stream. Six discussion leaders had been appointed, so chosen that three entertained views opposite to or differing from those of the other three. The discussion was quite general by representatives of both state and municipal health departments and also of various industries. The discussions embraced specifications in detail; whether they should be applied at the source or at the treatment plant; what wastes should be excluded from sewers or from streams; when it is more advantageous to an industry to discharge its wastes into a sewer and when into a stream.

Leading the last named discussion, N. E. Damron, Sanitary Engineer of American Cyanamid Co. said that usually the combined treatment of industrial and municipal wastes is more economical than separate treatment in a number of small plants because of availability of capital in the form of non-taxable sewer bonds, and no duplication of waste disposal facilities. Also there is improved treatability of combined industrial and domestic wastes; less critical control requirements for sewered wastes as compared with treatment and direct stream discharge, and better community relations.

The benefits of direct discharge to a stream by industry are summarized as follows by H. W. McEthany of Talon, Inc.: Only one set of requirements, those of the state, must be met. Usually a city requires some pretreatment prior to discharge to the public sewers; with a little more treatment an effluent suitable for direct stream discharge could be produced. No assessment or sewer charge is levied. Better community relations will exist. Industry often will have to pay more than the actual cost because when discharging to a sewer municipal methods of determining or apportioning the cost are often crude or unreliable.

"1954 Industrial Wastes Forum." Kenneth S. Watson, Leader. *Sewage and Industrial Wastes,* May.

The Chemical Industry And Stream Pollution

The problems of stream pollution in the chemical industry are of vital concern to the Manufacturing Chemists Association. In 1937 it established a Water Pollution Abatement Committee to acquaint the industry with the nature of stream pollution; to assist member companies to organize for sound and effective abatement programs; and to provide an opportunity for the exchange of technical information on waste treatment. In furtherance of its aims it is conducting a study of the Schuylkill River as it returns to normal from a formerly badly polluted condition, making a continuous study, through the Philadelphia Academy of Natural Sciences, of ecological factors, to learn just how a river cleanses itself. In a section of the river under study, only the most tolerant species of aquatic life were found; by studying this area over a number of years they hope to determine the succession of plants and animals, and what happens to the chemical composition of the water and its bacterial content; then to determine how recovery can be hastened.

"Research on Recovery of a Polluted River." By B. W. Dickerson, Chairman of the Committee, and Ruth Patrick, Curator of Limnology, Acad. of Natural Sciences. *Water & Sewage Works,* May.

Petroleum Wastes and Surface Waters

Tastes and odors in drinking water are the most significant pollution effect of petroleum refinery process waters. Directed toward qualitative identification of these

wastes in water, the application of separation of petroleum products through adsorption phenomena has been further developed. A previously available procedure, concentrating organic constituents from large quantities of sample by adsorption in an activated carbon filter and subsequent extraction with a solvent, could not clearly identify petroleum hydrocarbons on the basis of infrared spectra because of interference from oxygenated compounds. To minimize this interference a method has been developed utilizing adsorption chromatography on silica gel. The separation of the hydrocarbons in the sample into aliphatic and aromatic fractions made possible infrared spectra sufficiently typical for identification. The procedure was successfully applied to identify petroleum refinery wastes in 2480 gallons of canal water, 20,160 gallons of lake water used as a source of drinking water supply, and 8120 gallons of lake water collected at a distance of ten miles from refineries. In the last investigation petroleum refinery wastes were identified even though they represented a minor portion of the organic substances recovered from the water.

"Identification of Petroleum Refinery Wastes in Surface Waters." By A. A. Rosen and F. M. Middleton, U. S. Public Health Service. *Analytical Chemistry*, May.

Air-Borne Pollution Identification

A technique similar to that employed in microchemistry was investigated for adaptation to examination of air samples for airborne pollutants. Reagents in the gaseous or vapor stage were employed in gas chambers constructed of borosilicate glass. The glass chambers were composed of two sections of a standard taper joint, with the free ends fitted with two-way stopcocks. The sample, on a microslide or other holder was placed in the gas chamber and subjected to reaction with a gas or vapor flowing at a predetermined rate. After reaction, the slide was withdrawn and examined microscopically. It was found that certain pollutants could be identified by typical crystal formation. Reagents employed were acetic acid, hydrochloric acid, nitric acid, oxygen, nitrogen, hydrogen, water vapor, alcohol, ammonia, and acetylacetone. The method was found adaptable to testing the gas stream after it had passed the sample. This was useful in cases where morphological changes were not readily observable and gaseous reaction products are liberated. This would occur in the examination of samples containing arsenic, carbonates, sulfides, and sulfates, which, when subjected to suitable reagents, would liberate arsine, carbon dioxide, sulfur dioxide, and hydrogen sulfide.

"Gas Chamber Microapparatus in Identification of Air-Borne Pollutants," by J. L. Monkman, Department of National Health and Welfare, Ottawa, Canada. *Analytical Chemistry*, May.

Air Pollution Measurements

A study was made of the application of an instrument designed to measure light transmittance in an atmosphere known as a Transmissometer. The apparatus, consisting of a 350,000-candle power light

Mechanizing Water Main Construction

To supplement its present water system, which has proved inadequate in the late fall months, the city of Chilhowie, Va., has built a new line to tap water from Cole Spring, seven miles south of the city. This line will tie into an existing pumping station 18,000 feet from the spring. The 18,000 ft. of 8-inch main was laid by the Tipton Construction Company, Bristol, Tenn., under a $41,000 contract. Chilhowie, a textile, agricultural and fruit-growing area with a population of about 2,000, is furnishing all the materials for the job.

Tipton used a Parsons Trenchliner, powered by an International UD-9 power unit, to dig the trench to an average depth of 43 inches. A swing crane mounted on an International TD-9 crawler handled the pipe and an International Drott TD-9 Skid-Shovel did the backfilling.

● **TRENCH** for water main is dug by IHC powered Parsons trencher ± 43" deep.

● **LAYING** 18,000 ft. of 8-inch pipe by tractor mounted crane.

● **SKID-Shovel** handles job of backfilling entire water line.

source, a phototube receiver, an amplifier, and an indicator, was found to be sensitive to light transmission variations, with the distance between the points of transmittance and the receiver not greater than 1.5 km. Since reduced visibility is a significant manifestation of air pollution, it is expected that the Transmissometer will be a useful tool in air pollution control. Data on the weight of suspended aerosols, determined by a high-volume air sampler, and on the reflectance of the aerosols, determined by a filter paper sampler, were compared with the Transmissometer results, with little or no agreement. It was concluded that, for a comprehensive study, all three instruments must be used. It was found that light rain did not appreciably affect the light transmittance, while heavy snows caused a marked reduction. Heavy persistent rain reduced the aerosols that cause discoloration, while snow does not.

"Instrumental Measurements of Visibility in Air Pollution Studies," by George D. Clayton and Paul M. Giever, U. S. Public Health Service. *Analytical Chemistry,* May.

Disposing of Radioactive Wastes

Radioactive wastes may be in liquid, gaseous, solid state or some intermediate form; combustible or noncombustible. Regardless of what is done to or what use is made of a radioisotope, it will continue to give off radiation at its natural decay rate. As the use of nuclear energy by competitive industry expands, the necessity increases of learning how to protect the public from the injurious effects of radiation. An important source of radioactive wastes is the cooling of nuclear reactors by water, the residual activity being taken up by suspended matter and plankton in the water and growth in stream bed material. In some cases, the same water is used repeatedly, being filtered and demineralized after each use and the filter media being buried. Highly radioactive wastes are sometimes stored in large underground tanks —an expensive method. Another method is to absorb the fission products in specially prepared and extruded montmorillonite pellets, which are heated to form hard ceramic beads from which the release to their environment would be insignificant. Another method is dumping the wastes in the ocean far from shore, which is costly and the ultimate effects uncertain. Dilution in surface waters has possibilities but must be carefully and scientifically controlled.

"Disposing of Radioactive Wastes —a New Problem." By Abel Wolman and Arthur Gorman. *Wastes Engineering,* June.

• • •

Bridge Lighting

(*Continued from page* 109)

abling the bridge to become free of tolls about two years in advance of original estimates. It is anticipated that the bridge indebtedness will be retired within a period of twelve years.

● **TAPERED steel lighting standards are attractive day and night.**

The bridge was designed by Howard, Needles, Tammen and Bergendoff, consulting engineers. Nine main contracts were let to complete it and its approaches. To Kansas City Bridge Co., Kansas City, Mo., went the construction of the three river piers, superstructure, river spans and the east approach viaduct. The west approach viaduct was awarded to the Maxwell Bridge Co., Columbus, Kans. J. A. Tobin Construction Co., Kansas City, Kansas, had the contract for grading and paving the west approach; grading and paving the east approach was done by the Olson Construction Co., Lincoln, Nebraska. Toll collection facilities and the lighting were by the Evans Electrical Construction Co., Kansas City, Kansas, using Kerrigan lighting standards and General Electric lamps.

• • •

Industrial Wastes Gauging

(*Continued from page* 99)

on 115 volts. The electrodes are designed for direct installation into pipe lines or open channels and are protected from damage that might be caused by floating solids. The potentiometer indicator and the recorder are mounted on the instrument panel along with the flow recorder. The instrument panel is shown in Figure 3. All of the instruments and their appurtenances are mounted on springs for cushioning against shock encountered while moving the trailer from place to place. The air tube for the flow meter and the leads on the pH electrodes are of sufficient length that the trailer may be situated a maximum of fifty feet away from the gaging and sampling point.

Table I shows the costs involved in the design and construction of the trailer.

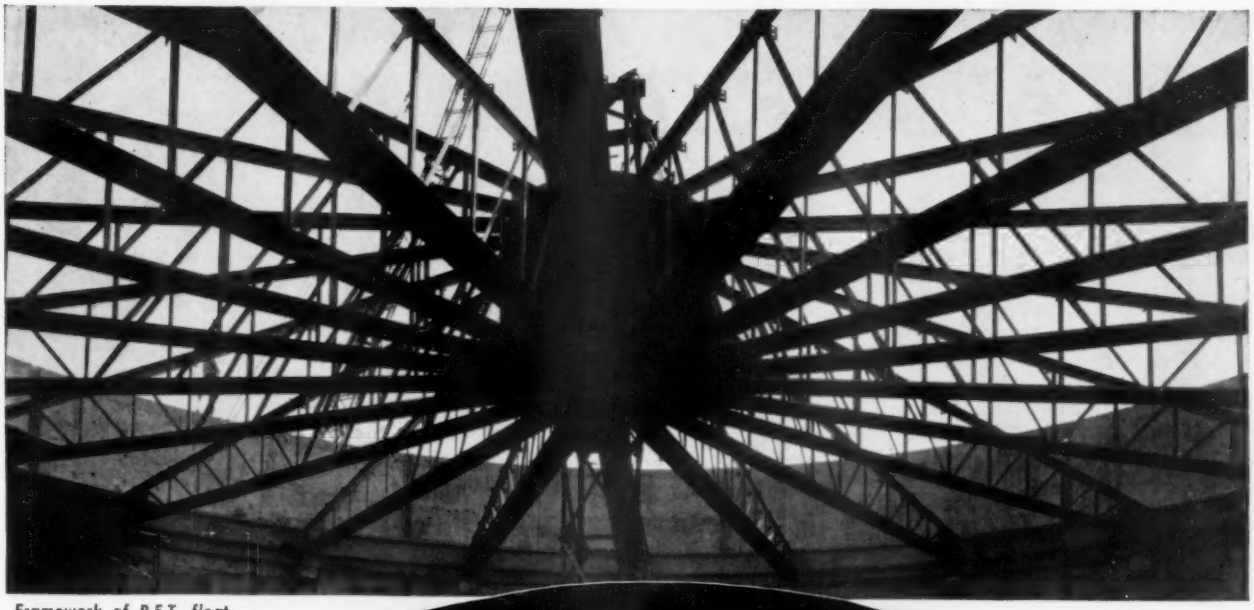
The compactness and self-sufficiency of the trailer make it extremely useful to the Sewage Disposal Section. It has been in service for only six months, but has already seen considerable use, mostly in conjunction with sewer damage investigations. It is felt that, in a short time, the benefits derived from the use of the trailer will more than compensate for the expense involved in its design and construction.

Equipment for the industrial waste gaging trailer was supplied by the following firms: pH Meter & Accessories—Beckman Instruments, Inc.; pH Recorder—Minneapolis-Honeywell Regulator Co.; pneumatic semiportable recording flow meter and accessories — Builders-Providence, Inc.; air compressor—Saylor-Beall, 1.63 cfh rating; generator—Empire, 1000-W., 115-V., 60-cy., single phase.

Table 1—Cost of Designing and Constructing Trailer

Trailer (army surplus)	$ 99.00
Flow recorder (incl. air compressor and all accessories	1,300.00
pH meter and recorder (incl. all accessories)	1,100.00
Generator	245.00
Materials of construction	390.00
Design	684.00
Construction labor	710.00
Total	$4,528.00

FRAMEWORK of Economy



Framework of P.F.T. floating cover being built for a sewage digestion tank.

Five sewage digestion tanks with steel floating covers and a 50,000-gal. Horton Watersphere® at the Sacramento Sewage Disposal Plant.

for Sacramento Sewage Disposal Plant

This intricate framework was built for one of the five P.F.T. steel floating covers installed on the 100-ft. diam. digestion tanks at the City of Sacramento's sewage disposal plant by the Chicago Bridge & Iron Company. The floating covers aid the economical production and recovery of sludge gas which in turn, is used to heat sludge and for heating buildings. This is but one example of CB&I's ability to build welded steel plate structures for economy and utility. Write our nearest office for further information on tanks and steel plate work.

CBI

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PUBLIC WORKS DIGESTS

The WATER WORKS Digest

Geological Surveys Reveal Great Water Supply

When use of wells in central Illinois had lowered the ground water level dangerously, the State Geological Survey made a geophysical survey of the underlying glacial drift and discovered a promising deposit below a depth of 175 ft. and at least 145 ft. thick, and in 1947 wells drilled here produced up to 3 mgd. A study of well drilling records and of geological formations has shown that this water comes from West Virginia by way of an underground valley extending across Ohio and Indiana. This preglacial river, called the Teays in Ohio, and the Mahomet in Illinois, joins the ancient valley of the Mississippi. The Illinois Geological Survey estimates that more than 200 sq. mi. in Champaign Co., Ill., have suitable geologic conditions for the occurrence of good water resources. In addition, since the development of these new wells, withdrawal from the old well field has been reduced to a rate less than the recharge and the water level has risen 50 ft. Thus an abundant water supply is assured.

"A Modern Water Development in an Ancient Valley." By Frank C. Amsbary, Jr., V. P., Northern Illinois Water Corp., and John W. Foster, State Geological Survey, *Water Works Engineering*, June.

Supervisory Control And Telemetering

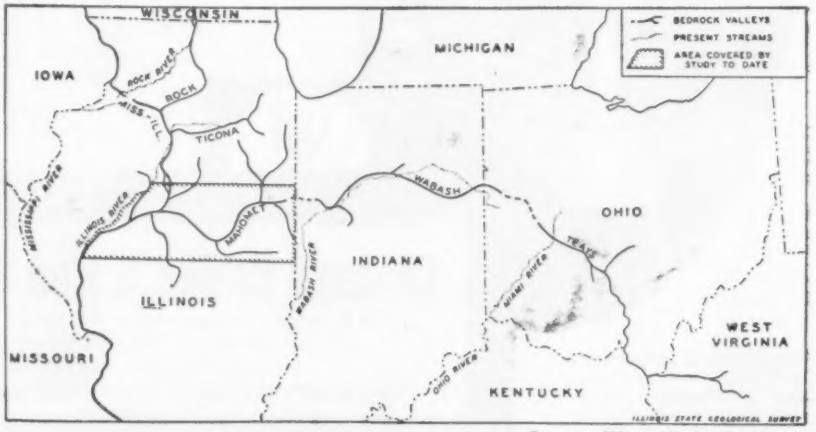
Operations usually performed by supervisory control include the starting and stopping of pumps and the opening and closing of valves. Telemetering includes remote meter readings of tank or reservoir levels, pressure and flow. Use of them has increased because of the increasing cost of labor at pumping stations, improvement in service, and labor unreliability. Two primary types of supervisory control equipment have been evolved. The older type is the "impulse," in which all operations have signals in the form of short electrical pulses, somewhat similar to those obtained in telephone dialing. Since short pulses could be duplicated from external sources, the remote-location equipment transmits an equivalent grouping of pulses back to the controlling station as a check.

In place of control impulses easily duplicated from other sources, another system composed of a sequence or combination of audio-frequency tones has been evolved; in place of using the one checkback feature of the impulse system, automatic checking of the signal is provided at the remote location as it is received, with six different checks necessary before an operation is allowed to take place. In this "Audio-sequence" type of control, all remote control signals are composed of a minimum of three (usually four) audio-frequencies transmitted one at a time in a definite sequence, and the resulting operation depends only upon the order in which the tones are transmitted. The audio-frequency tones usually used are 210, 310, 350, 390 and 450 cycles. This system allows generally faster operation than is possible with the impulse system. The channel connecting the central controlling location with the one or more remote stations is often a pair of telephone wires. (Microwave radio is now being used more often.) It is fairly common to have the same pair of wires used for telephone also. The author describes in detail four specific installations.

"Remote Control in Water Systems." By E. Wylie Head, Control Corp., *Jour., AWWA Ass'n*, May.

Chlorinating Water In Elevated Tanks

The slime coating in water pipes serves as a habitat for coliform organisms, and these are often washed loose by high velocities of flow due to peak consumption, and residual chlorine can then be maintained throughout the distribution system only by secondary chlorination. One way of effecting this in Baltimore, Md., is to apply HTH, perchlor, penchlor or liquid chlorine to the water in the elevated tanks scattered throughout the distribution system, at weekly or other intervals during the summer. This is done usually by men climbing to the top of the tank. The mental and physical hazards of this are such that the author believes that the chlorine solution should be pumped to the top of the tank, through a plastic pipe by a stainless steel pump. For



Courtesy Water Works Engineering

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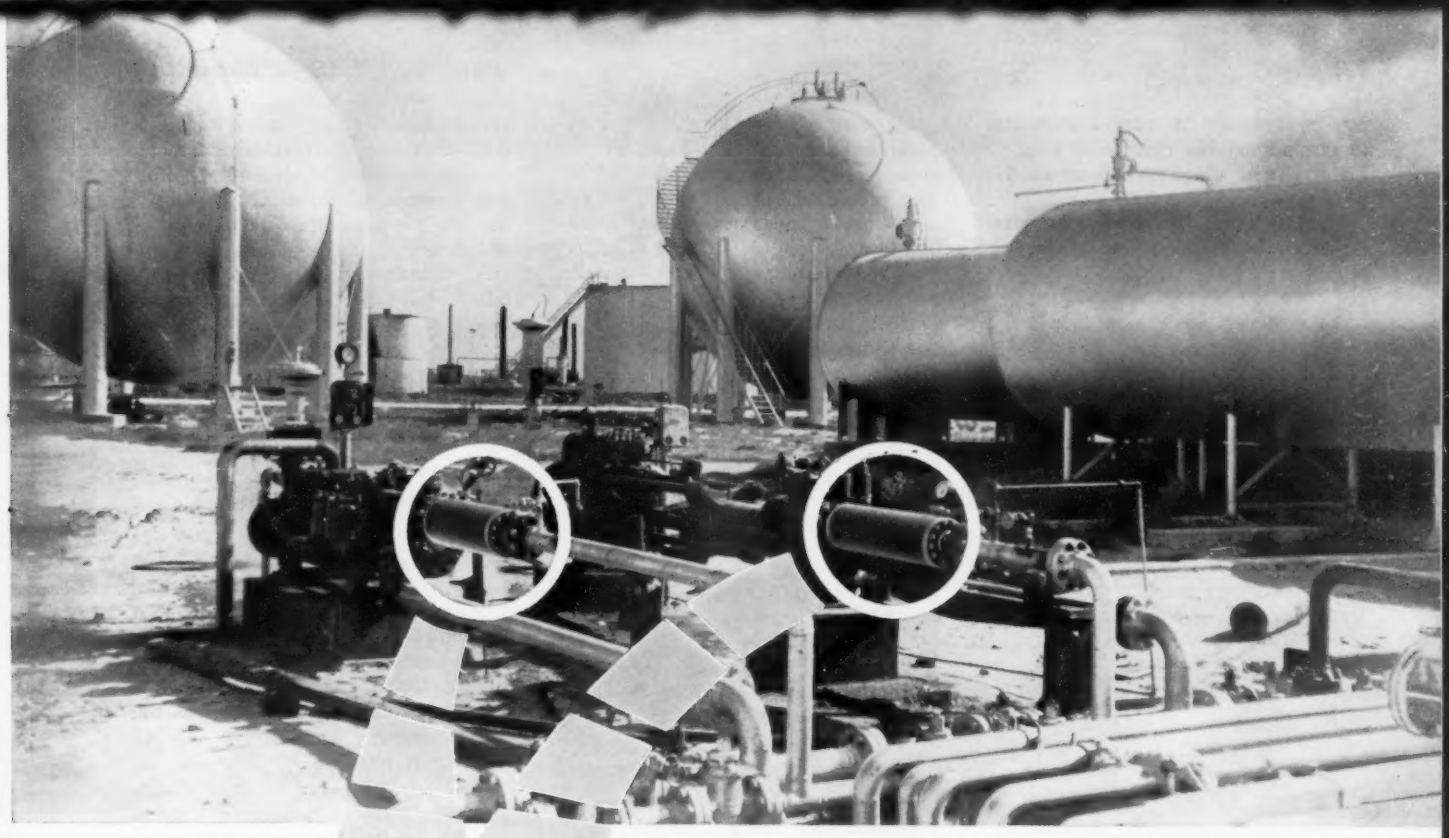

New IN-LINE Westinghouse Desurger prevents pressure surges

Comprehensive laboratory tests, and actual service records in the field prove that Westinghouse Air Brake Company's new in-line desurgers prevent damaging pressure surges, pump pulsation, and water hammer shock. They protect valves, fittings, instruments, pipe and pumps, wherever liquid flows. They increase flow capacity, reduce maintenance, and occupy very little space. Write for descriptive catalog A6-118.01.

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Industrial Products Division
WILMERDING PENNSYLVANIA

Westinghouse Desurgers protect 1½" through 18" diameter pipe systems operating at pressures through 2,000 psi.

power, it would be more economical to use a portable generator than to install fixed electric power at the tank.

"Chlorinating Water in Elevated Distribution Tanks." By Edward S. Hopkins. *Public Works,* July.

Causes of Main Failures

A survey of pipeline failures in 2,034 miles of pipe in eighteen cities revealed the breaks in one year to vary from 16 to 55. The major cause (46%) was either faulty construction or other underground construction. Other causes were excessive pressure, corrosion, excessive load, and faulty pipe (4%). The pipe materials now in common use—cast iron, steel, asbestos cement, and concrete—are so manufactured under specifications, with tests of material and pressure tests, that it is unusual to find failures due to faulty pipe. Failures are often due to damage to pipe before installation, but most failures are caused by faulty installation, such as requiring them to act as beams. Defective joints are a major source of trouble, which is rapidly being reduced by using mechanical or rubber ring joints. Corrosion, although not always obvious, is often the cause of failure. Other causes include temperature variations (see the digest in this issue), water hammer, too large taps, faulty service line connections, and faulty thrust blocking.

"Factors Causing Main Failures." By Frank E. Dolson, Supt. St. Louis County Water Co. *Jour., AWW Ass'n,* May.

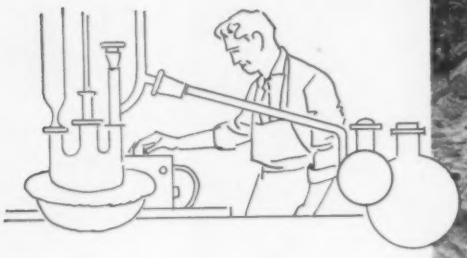
Pipe Breaks Due To Temperature Variations

The water distribution system in Detroit, Mich., contains over 3,000 miles of cast-iron pipe. There is an annual average of 20 breaks per 100 miles of pipe in this system, the maximum number occurring during December to March, when the temperature of the water in the mains may be as low as 34°; in summer it may be 42° higher. The breaks in most instances are circumferential; this suggests tension in the mains due to contraction, which in turn suggests fixity at the pipe joints. Investigation of breaks in pipe of various ages and with both lead and sulfur jointing materials led to the conclusion that most of the breaks were due to corrosion of pipe walls which had reduced the thickness to the point where they were no longer able to resist the tension due to lowered temperature and fixed joints provided by the use of sulfur compounds; and that the economic life of cast-iron pipe in underground service, subject to corrosion, can be extended by providing for freedom from restraint in the joints. Niemeyer, of the Indianapolis Water Co., has found that use of mechanical joints has greatly reduced the number of pipe breaks in that system.

"Detroit Experience With Sulfur Compound Jointing Material." By Leo V. Garrity, Chf. Eng'r. *Jour., AWW Ass'n,* May.

Accelerating Precipitation In Softening Plants

This paper presents some of the results obtained in studies of the mechanism of calcium carbonate precipitation in lime softening of water. Conclusions reached were: 1—Lime-soda softening reaction is a "rate process" which takes place quickly at high concentrations of reacting substances but proceeds more slowly as the reaction approaches equilibrium. 2—Rapid mixing with preformed crystals ac-



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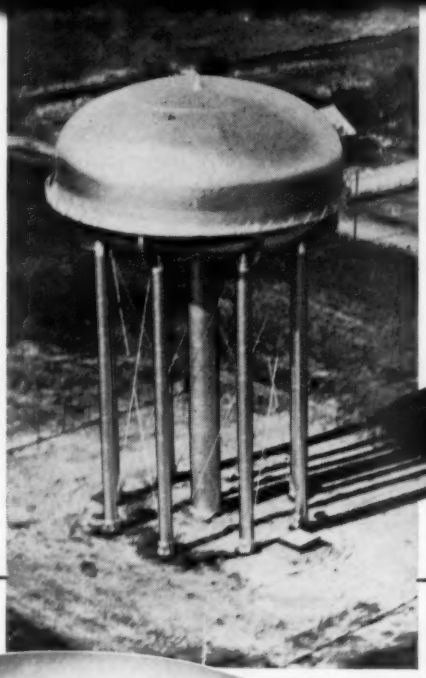

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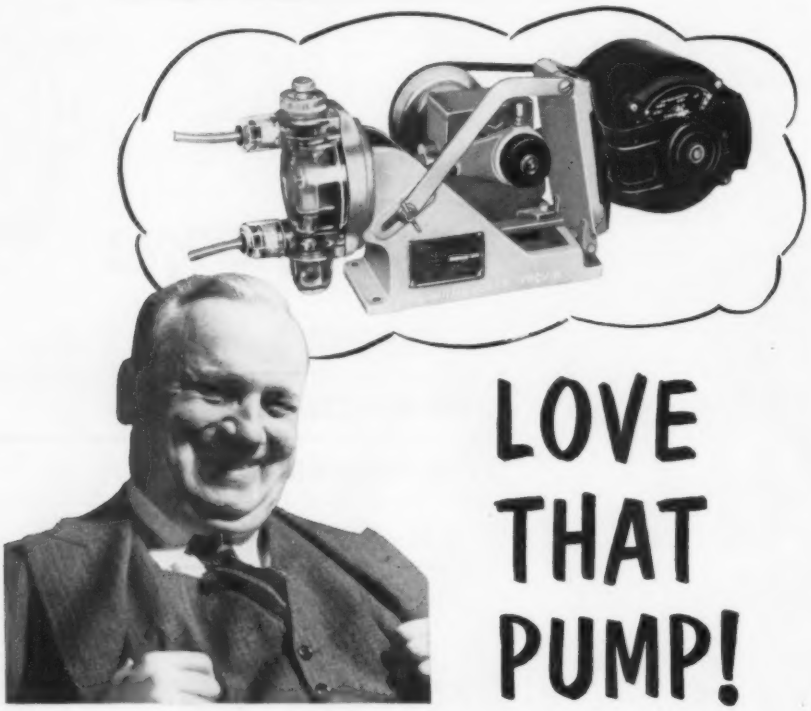
celerates the reaction. 3—When a water containing only calcium bicarbonate hardness is softened with lime in the presence of enough preformed crystals to approximate equilibrium conditions, a relationship can be shown between calcium hardness and pH level. If calcium noncarbonate hardness is present, the same relationship can be obtained by adding soda ash in a chemically equivalent quantity which will react with the noncarbonate hardness. 4—Lime-soda removal of calcium in the presence of preformed calcium carbonate crystals occurs through the growth of the crystals. These settle rapidly and produce an effluent of high quality. 5—Stirring treated waters with preformed crystals is of value in producing a stable, low-calcium water after recarbonation or split treatment. 6—A minimum calcium level of 15-25 ppm (as $CaCO_3$) can be obtained by stirring lime-soda softened or recarbonated water with copious quantities of calcium carbonate crystals at an equilibrium pH of about 9.8—10.2.

"Accelerating Calcium Carbonate Precipitation in Softening Plants." By Robert F. McCauley, Assoc. Prof. of C. E., Michigan State College, and Rolf Eliassen, Prof. of San. Eng. M.I.T. *Jour., AWW Ass'n.*, May.



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Present Status of Saline Water Conversion

Pursuant to an act of Congress, the Department of the Interior is endeavoring to develop a low-cost process for converting saline water to fresh water for agricultural, industrial, municipal and other uses. Recent results have indicated that no single process will provide fresh water for all purposes at all locations and under all circumstances. Investigation indicates that vapor-compression may permit the production of fresh water from sea water for approximately one-fourth the cost of distilling water by any present method, or about $100 to $200 per acre-foot. Other processes under development include an ion-transfer membrane demineralizer; solar distillation; solvent extraction; freezing; osmotic processes; and ultrasonics. Obtaining fresh water from sea water at a price which municipalities and some industries might pay seems to be in sight.

"Saline Water Conversion." By Joseph J. Strobel, U. S. Dept. of the Interior. *Public Works*, July.

Excluding Ground Water From Infiltration Gallery

Anacortes, Wash., is increasing its water supply, now obtained from the Skagit river, and filtered by horizontal radial wells driven 20 ft. below the bottom of the river. Ground water flowing toward the river has a high iron content, and of the eleven horizontal collectors, two are so driven as to intercept the groundwater that would otherwise reach the main well, and conduct it to a separate well and thence to the river.

"Infiltration Gallery Saves Dolloars, Filtration Plant Extension Avoided." *Engineering News Record*, June 9.

Chicago Reduces Underground Leaks

As a result of the last 23 years of intensive underground street leakage work and 13 years of plumbing inspection and repair, the average annual pumpage by the Chicago Water department has been reduced from the peak of 1060 mgd by 43 mgd, while during the same period the metered water has increased by 207 mgd. Of the leakage found, 37% was at joints, 47.8% in

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This carton helps you in still other ways. Because it is round it rolls—like a hoop—from truck to job site or wherever needed. When carrying is necessary just slip your arm through the convenient center hole. Alternated nomenclature and color coding make content identification easy. Important, too, is the fact that unused tubing remains in the carton—protected to the very last inch from dirt and damage and much easier to handle.

And that isn't all. This carton contains Wolverine copper tube—the tubing that is always clean, dry and easy to bend in the shop or on the job. Remember, ask for "the roll of tube that rolls"—specify Wolverine the next time you visit your wholesaler.

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service pipes, broken pipe 3.5%, hydrants 2.7%, valves 1.7%, abandoned pipe 7.3%. Leaks from broken pipes discovered were small in number because when a pipe breaks it is known at once and repaired so quickly that no measurement of amount of leakage is possible. Slum clearance has removed old plumbing and obsolete services, and the per capita consumption in clearance sections has been reduced from 500 gpd to 60 gpd in new metered houses. It is estimated that by complete meterization and continued leak detection work a further reduction of 200 mgd can be made in the annual pumpage.

"Chicago Makes Notable Progress in Reducing Underground Leaks." By Justus B. Eddy, Eng'r of Water Distribution. *Water Works Engineering*, June.

Why Philadelphia Uses Hydrofluosilic Acid

Philadelphia, Pa., started applying fluorine to its water supply in September, 1954. It decided to use acid instead of dry powder because the acid is available at two chemical plants in the Philadelphia area and could be hauled by tank truck directly to the five points where it is applied. The cost of the acid at that time was slightly more than that of the dry powder, but the cost of the feeding equipment was much less and the facilities required were much simpler. The net cost of the fluoride in this form is 13.7 cents per pound. This gives an annual per capita cost for chemical of 8 cents. There have been no difficulties and no injuries in connection with handling the acid. Some difficulty with the pipe used, due to defective plastic lining, has been corrected by changing to Saran pipe. Difficulty with fumes escaping inside the building has been corrected by carrying the vent pipe outside the building.

"Hydrofluosilicic Acid Is Used for Philadelphia Water." By Gerald E. Arnold, Gen'l Supt. *Water Works Engineering*, June.

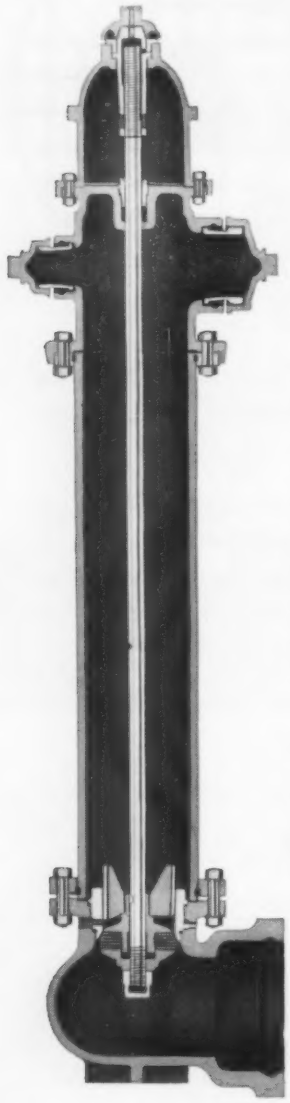
Removal of Radioactive Strontium by Lime-Soda

The study described above was part of a research project conducted for the U. S. Atomic Energy Commission to find the most feasible means of removing strontium since the mechanism of removing radioactive strontium is similar in principle to the removal of calcium from hard water. It was found that one pass through a lime or lime-soda softening plant operating at maximum efficiency will reduce radiostrontium activity by 50%. A process of repeated precipitation will remove more than 99%. The presence of up to 10 ppm of stable isotopes of strontium will not interfere with radiostrontium removal. Water treatment plants having separate mixing, coagulation and settling facilities could be adapted to employ the repeated precipitation process described.

"Radioactive-Strontium Removal by Lime-Soda Softening." By Robert F. McCauley and Rolf Eliassen. *Jour., AWW Ass'n*, May.

Beavers on Watersheds

Some consider beaver dams beneficial to watersheds, as they reduce rapid runoff and erosion; but various water supply operators think that this benefit is outweighed by the disadvantages, which include clogging of intake screens and valves with debris from beaver activities, and increase in chlorine demand of the water. Since 1940, health officials in Montana have



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been concerned over the possibility that tularemia, which causes the deaths of many beaver and muskrats, might attack humans through the water supply. Investigations by the USPHS and others have led to the conclusion by the authors that, while tularemia bacteria were not present in significant quantity in the stream under study, in other locations heavy chlorination might be required to counter this hazard.

"Beaver Activity and Water Quality." By George Malben, W. W. Supt. of Helena, and H. B. Foote, Mont. State Bd. of Health. *Jour., AWW Ass'n*, May.

Other Articles

"Tacoma Meters All Water Services 38 Years After First Recommended." By W. A. Kunigk, Supt. Western City, May. Water Works Engineering, June.

"Equipment in the Squaw Peak Filtration Plant." Public Works, June.

"Design for a **Small Water** Plant," Gainesville, Ga. By Guy Browning Arthur. Public Works, July.

"Modern Sewage and Water **Facilities** for a Thousand People." By Lester Lee. Public Works, July.

"Iron Salts and Water Coagulation." Experiences in six cities. American City, June.

"Manchester's 82-Mile Aqueduct from Haweswater" (England) including 8 tunnels and 34 miles of 8-ft. siphons. The Surveyor, May 28.

"Missouri River Basin Development." By Dale L. Maffitt, Gen'l Mgr. of W. W., Des Moines, Ia. Jour., AWW Ass'n, May.

"Central Dispatching for Distribution Systems." Describes the system at Houston, Tex. By R. M. Collier. Jour., AWW Ass'n, May.

"Laws of Florida Governing Water Use." By Frank E. Maloney, Prof. of Law, Univ. of Florida. Jour., AWW Ass'n, May.

"Hydrologic Aspects of **Ground Water Law.**" By Thad G. McLaughlin, Geologist, U. S. Geological Survey. Jour., AWW Ass'n, May.

"Problems of **Small Water Systems** in Maryland." By Holmes Orgain, State San. Engr. Jour., AWW Ass'n, May.

"Financing New Water **Main Extensions** in California." By Philip F. Walsh. Jour., AWW Ass'n, May.

"Two-Way Radio Is Indispensable for Water Department" at San Antonio, Texas. By R. A. Thompson, Jr. Gen. Mgr. Public Works, July.

NEW POLY-CIDE

Many municipal sewage plants create odor nuisances

IMPROVED ***BROOKS POLY-CIDE*** FOR MUNICIPAL SEWAGE PLANTS REDUCES OR ELIMINATES ODORS AT THEIR SOURCE

PRIMARY AND SECONDARY SETTLING TANKS. Odors produced here may be controlled by several methods depending on whether the odor is continuous or intermittent.

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SLUDGE BEDS. Odors associated with sludge beds are usually short-lived. They are greatest right after fresh sludge has been added and taper off to a negligible value in a matter of several days. A POLY-CIDE water-mix should be sprayed over the surface of the bed immediately after the fresh sludge has been added.

RECEIVING STREAMS AND RIVERS. POLY-CIDE dripped into the receiving body at a point slightly upstream from the discharge line will effectively control these odors.

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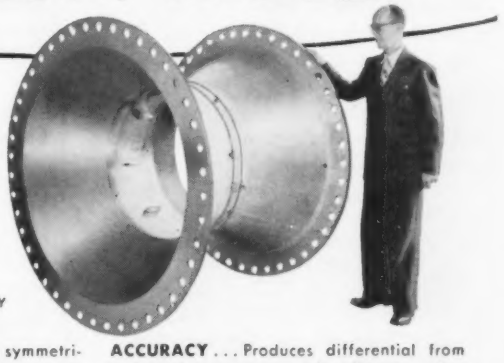

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Laying One Sewer Above Another

When a 2100-ft. stretch of 15-in. sewer in Westchester Co., N. Y., became of insufficient capacity to carry the increasing amount of sewage, it was decided to substitute 24-in. pipe, laid in the same trench one foot directly above the old sewer because of economy and minimum inconvenience during construction. Coated and lined corrugated metal pipe was used, entering the same manholes as the old sewer. When the latter becomes surcharged, the sewage rises in the manholes to the level of the new sewer, which is below that which would cause flooding of cellars. The old house connections were not disturbed but continue to discharge into the old sewer.

"Over-Under Relief Sewer Design Simplifies Construction." By William A. Marcon, Project Engr. *Water & Sewage Works*, May.

Sewerage Literature In 1954 Reviewed

The annual review of the literature of the previous year dealing with sewage and waste treatment has become a most important feature of *Sewage and Industrial Wastes*. Each year the review becomes longer. This year it is divided into two sections, the first of which, appearing in the May issue, is 57 pages long. It deals with analytical methods, sewage and radioactivity, under the headings Biochemical Oxygen Demand; Oxygen Consumed; Dissolved Oxygen; Oxygen Compounds; Nitrogen Compounds; Metallic Ions; Halogen Compounds; Sulfur Compounds; Phosphorus Compounds; Cyanogen Compounds; Rare Earths; and Miscellaneous. It lists 100 articles dealing with these subjects.

Under the general head of "Sewage," the review is classified under the sub-heads: Physical and Chemical Methods; Biological Filters; Activated Sludge; Disinfection; Sludge Digestion; Sludge Disposal and Utilization; Mechanical Equipment; Detergents; Lagooning, Irrigation and Reclamation of Sewage; and Sulfides, Odors, Corrosion and Control. Under this head 212 references are listed.

In discussing "Radioactivity," 116 articles are reviewed under the subheads: Natural Background; Fall-Out; Contamination and Decontamination; Surveys and Water Treatment; Treatment and Disposal; Utilization; Biological Effects; Radiochemical Methods; and Instrumentation.

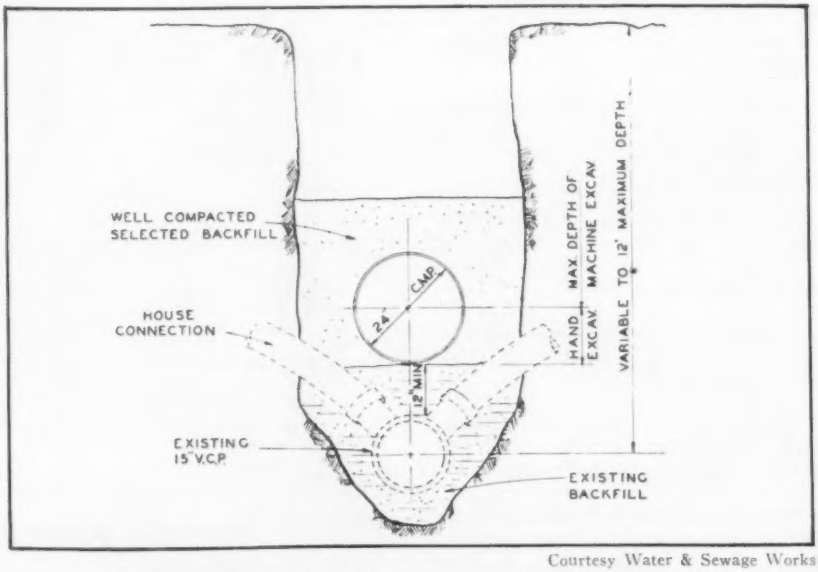
The discussion of "Sludge Digestion" was further subdivided into Theory and Mechanism; New Developments; Effect of Other Materials; Gas Production; Design; Operation and Maintenance. "Sludge Disposal" was subdivided into Disposal of Digested Sludge; Sludge Drying and Incineration; Sludge Utilization; Composting of Municipal Wastes; Raw Sludge Oxidation: and Vacuum Filter Cloth Life.

Each of the 428 articles listed is abstracted briefly. Thus it is possible for any one interested in any feature of sewage treatment to locate all important articles relative to it that appeared in print during 1954.

"A Critical Review of the Literature of 1954 on Sewage, Waste Treatment, and Water Pollution." By Committee on Research, Sect. A, FSIWA. *Sewage and Industrial Wastes*, May.

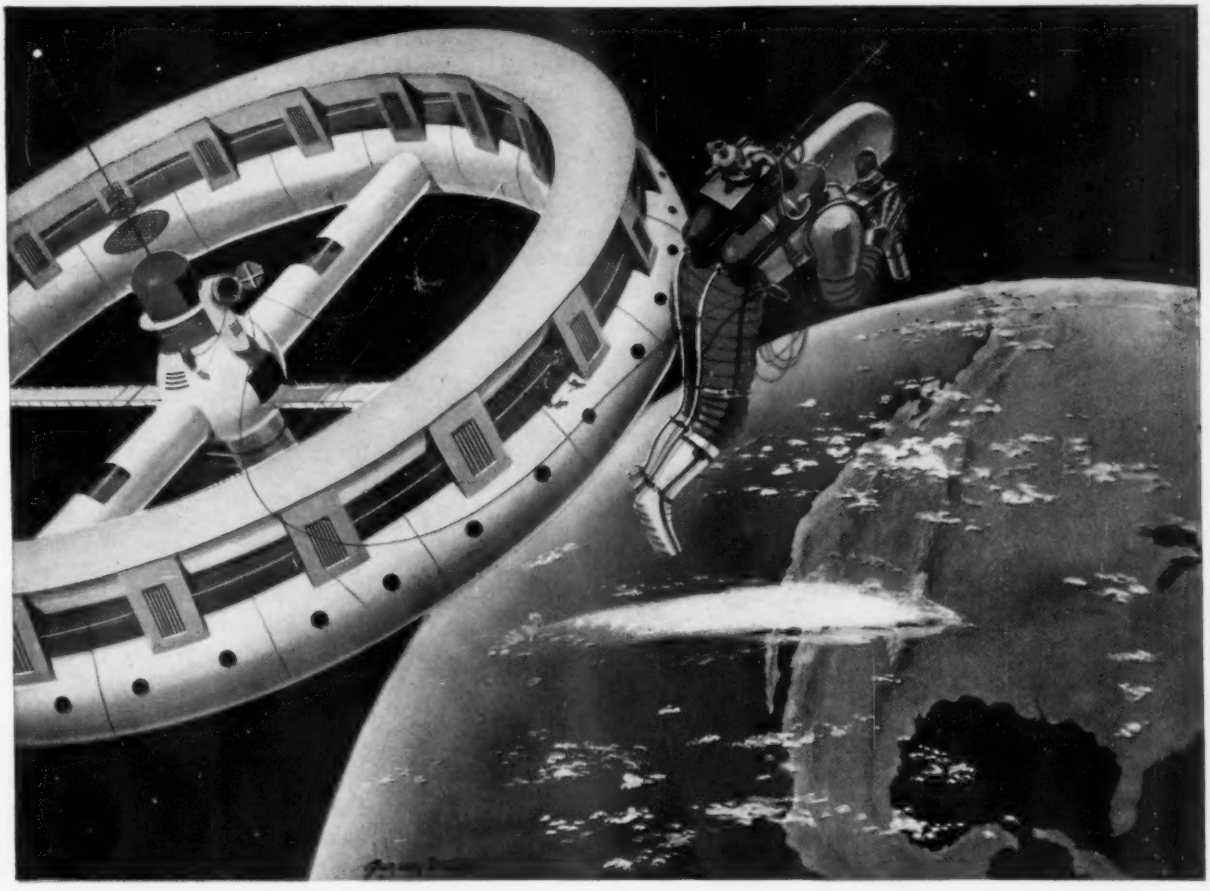
Mechanical Air Diffuser for Activated Sludge

The author describes studies made on the use of various mechanical air dispersers in order to increase the rate at which oxygen can be absorbed by liquids where the rate of oxygen utilization is extremely high. Extremely high rates were obtained by using specially designed mechanical dispersers fed with compressed air. The air is fed into an impeller at the bottom of the tank which can be revolved at any desired speed, the rotating blades breaking up the air into fine bubbles and dispersing them into the liquid. Oxygen absorption efficiencies of 30 to 40% are possible, but at high cost for



Courtesy Water & Sewage Works

● **METHOD used in laying two sewers in the same trench.**



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power to drive the dispersers and compress the air, and efficiencies of 10 to 12% are probably the most economical. Their use would permit higher solids concentration in the mixed liquor of activated sludge plants, and the treatment of high-strength industrial organic wastes.

"Oxygen Absorption Studies Using Mechanical Air Dispersers." By A. A. Kalinske, Infilco Inc. *Sewage and Industrial Wastes,* May.

Use of Alum For Drying Sludge

Stamford, Conn., used alum for hastening sludge drying on filter beds from 1943 to 1953, when the beds were replaced by vacuum filtration. From this experience, the author has concluded that the alum solution must be added to the sludge as it enters the bed. A good working concentration is about 4 lb. of alum to a gallon of water, or to 450 gallons of sludge, thoroughly mixed with it. The reduction of water content in 24 hours is nearly twice as great for treated sludge as for untreated, and it dries in less than half the time, with a thinner sludge, lighter in weight, and with more cracks more uniformly spaced. Objectionable odor is almost entirely eliminated. The cost is about $8 per 70,000 gallons of sludge.

"Alum Speeds Up Drying of Sludge and Overcomes Plant Overload." By Walter E. Thompson, Supt. *Wastes Engineering,* June.

Sewage Sludge Filter Blankets

At the West-Southwest sewage treatment plant of Chicago there are 98 vacuum filters. Originally the filter blankets used were napped wool twill stretched tightly over monel metal screening and held by spirally wound copper wire. The maintenance was high, and the method of fastening the blankets has been changed to one which reduces the time of changing the blankets and lengthens their life. At the same time, various materials for filter blankets were tested, 11 in all. The qualities needed are pliability, toughness, snag and abrasion resistance, with a minimum tendency to stretch; a nap ½ in. or more long; suitable pressure loss; and resistance to chemicals used in conditioning the sludge and in acid-washing the blankets. At present no cotton blankets are used. Most used have been untreated wool twill (15-ounce type has proved best) treated at the mill with a permanent type of bactericide. Vinyon proved unsatisfactory. Nylon shows promise and testing of it is being continued. Orlon has poor acid resistance. Dynel and dacron show promising characteristics, the latter being rated No. 1 in the comparative rating, and dynel No. 2, followed by 14-15 oz. treated wool. In selecting a blanket, it is important that it be tough, strong and pliable; abrasion resistant and dimensionally stable; of suitable pressure loss; of long nap; and acid and chemical resistant; easily installed with minimum stretch; and responding well to water and detergent wash, acid wash and chemical treatment.

"How to Select and Care for Sewage Sludge Filter Blankets." By Warren L. Shedden, Asst. Mech. Engr. *Water & Sewage Works,* May.

High-Speed Sludge Heating

A recently developed sludge heating arrangement uses direct heating to bring the temperature of primary sludge up to the optimum for charging into the digester. Sewage gas is burned in a specially designed combustion chamber and the heated combustion products are diffused

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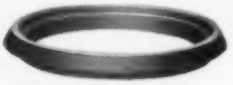
then save money with the original NEENAH manhole adjusting rings

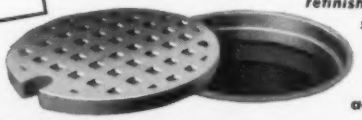
Adjusting ring added to existing manhole permits resurfacing for as little as 20% of the cost of replacing or raising existing frame.

Neenah Foundry adjusting rings boost manhole cover flush with refinished roadway surface — may save as much as 80% of cost of digging and resetting to new grade. Cutaway view shows old manhole frame still in place after resurfacing — thanks to the addition of a Neenah adjusting ring. Available for square and rectangular frames and in standard and special sizes.

Type A adjusting ring with vertical outside surface.



Type B adjusting ring with flared outside surface.



Existing manhole lid sets flush with refinished roadway surface after adding the cost-saving Neenah adjusting ring.

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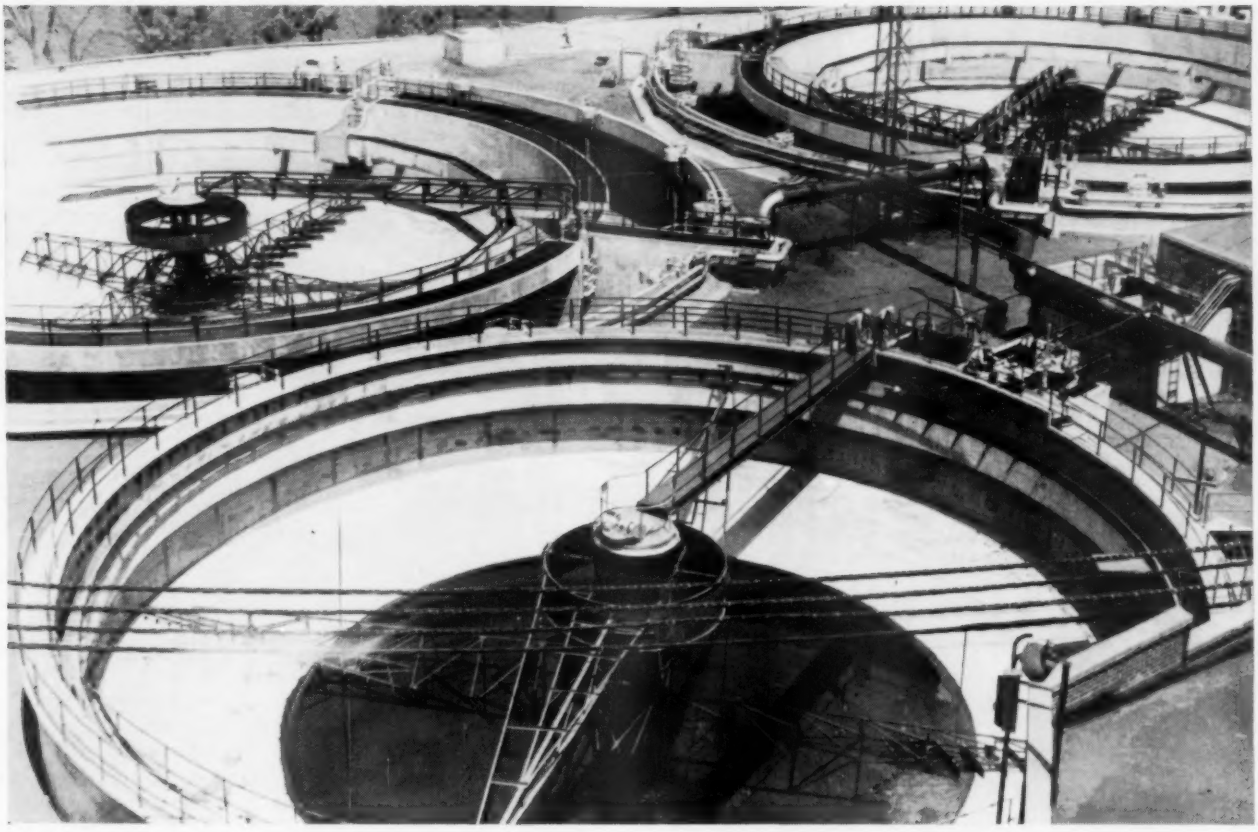

General view of the plant during final stages of construction. Dorr Primary Thickener is in foreground with Currie Claraetors in rear.

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West Virginia Pulp and Paper Company Pioneers New Waste Treatment Process

Dorr-Oliver Equipped Plant Sets Pattern for Industry

Covington, Va. Industrial waste treatment has taken a major step forward with the start-up of this new plant at West Virginia Pulp and Paper Company's Covington, Va., mill. A "first" for the alkaline pulping industry, it points the way toward a solution of these tough-to-handle wastes. Two years of pilot plant work went into the final design and the Covington mill's River Research Group worked closely with the National Council for Stream Improvement throughout all phases of the project. The firm of Weston, Eckenfelder and Hood was also called in to make an intensive round-the-clock analysis of pilot plant results.

The flowsheet as developed is unique. Basically it employs the activated sludge process, one of the standard methods for treating municipal sewage. A departure from standard practice is the addition of certain nutrients essential to the life of the bacteria which carry out the treatment process. Another is split treatment providing primary sedimentation for the portion of mill wastes containing solids and then parallel aeration and final sedimentation for the entire flow. A third is the use of complete instrumentation with one control panel governing the process and recording results.

Average treatment plant design is 16 MGD with a maximum capacity of 25 MGD. Major equipment units include a Dorr Primary Thickener and two Currie Claraetors.* These latter units employ Dorr Final Clarifiers surrounded by annular aeration channels. In this way two distinct phases are carried out in a single unit. When the plant reaches full operation an estimated BOD reduction of 80-90% will be made in the mill effluent being discharged to the Jackson River.

Dorr-Oliver Incorporated, Stamford, Conn.

*Trademark, Reg. U. S. Pat. Off.

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into the sludge in a small heating tank, obtaining high thermal efficiency. The system employs the Superheat burner design developed by the Selas Corporation. It has been operated for more than two years at the Philadelphia Northeast Treatment Plant. Installations now are furnished as a "package assembly" by the Chicago Pump Co. At Philadelphia the sludge is pumped to a battery of 7 heating tanks, the burner in each of which is rated at 2-3 million BTU per hr. The gas is heated to about 2,400° F and leaves at 125°. The heated sludge is pumped to the digester at a temperature of 110° F. Digester temperatures have remained between 95° and 100° throughout the year. Gas production has reached 12 cu. ft. per pound of sludge.

"High Speed Sludge Heating." By A. A. Furczyk, Selas Sales Corp. *Public Works*, July.

Laying Sewer Pipe Under Water

At Coral Way Village, Fla., a contractor laid 7,000 ft. of 6-in. to 15-in. vitrified pipe in trenches containing water 6 to 10 ft. deep. Tests showed infiltration in 8-in. lines to be only 10 gal. per 1,000 ft. per 24 hr. Pumping so much water from the trenches was considered to be impracticable, and the contractor minimized under-water joints by joining seven lengths of 3-ft. pipe on the bank, and lowering the 21-ft. length into the trench by means of a "strongback". In the trench, the joints between the 21-ft. lengths were made under water by skindivers, using grout-expanded inflatable rubber gaskets, into which the grout was pumped at a pressure of 50-60 psi. The contract cost of the job was $50,000.

"Skindivers Beat Tough Pipelaying Job." *Engineering News-Record*, June 9.

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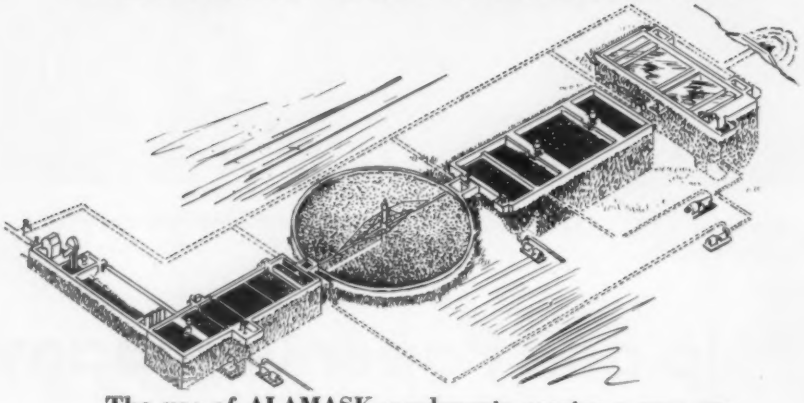

The use of ALAMASK reodorants creates a new approach to solving air pollution problems due to the handling and disposal of solid, liquid and gaseous wastes. At very low cost, ALAMASK can be used to achieve either a masking of the malodor created by municipal waste or creation of a condition that results in a non-objectionable odor.

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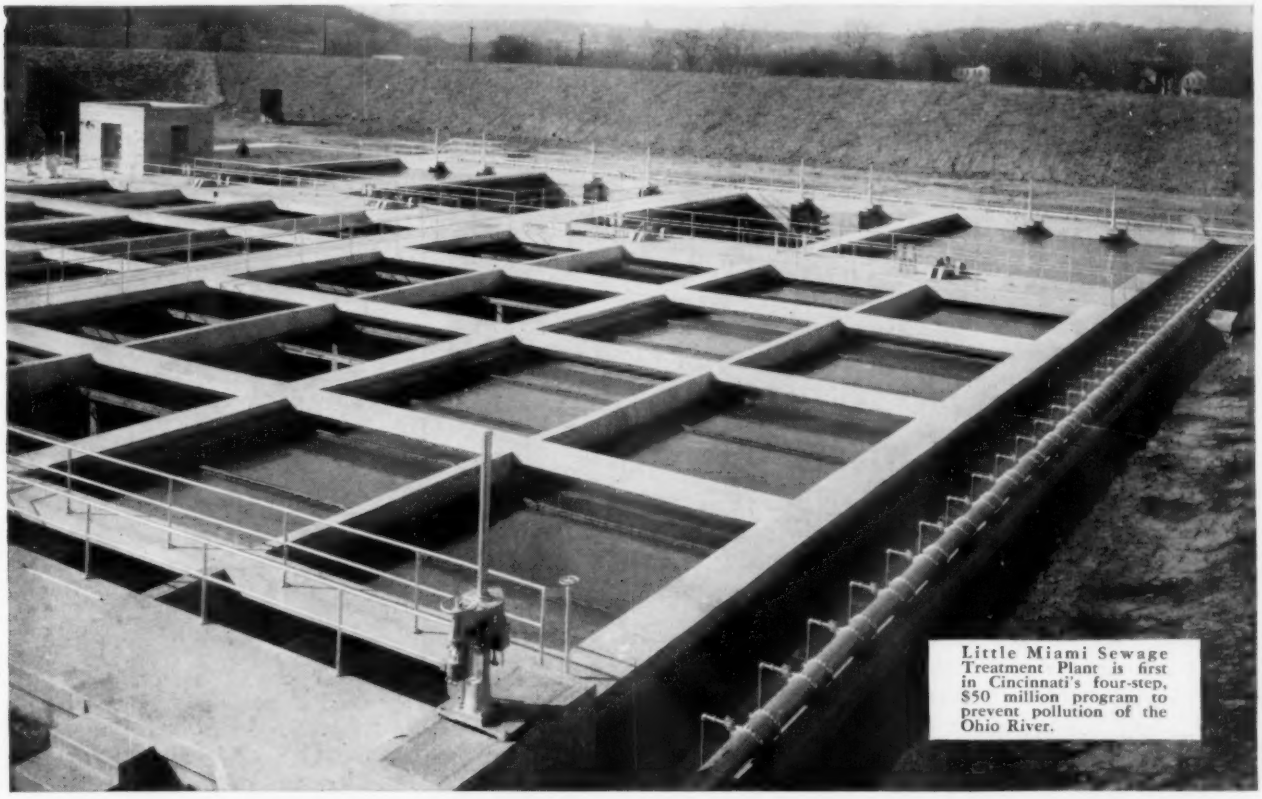
Designing Sewer Maintenance Yards

To minimize time lost by men and equipment in going from the maintenance yard to job locations, a city should be divided into districts each containing 600 to 800 miles of sewer and a yard be located as centrally as possible in each. In general, a 3-man maintenance crew will be necessary for each 100 miles of sewer. The architecture of the buildings and landscaping should blend harmoniously with the surrounding properties. It is desirable to surround the open yard area with 6-ft. high block walls. All equipment and some of the materials should be under cover. A gas house should be provided for storing oil and kerosene drums and cleaning and storing lanterns. Other features are a shop for making minor repairs, and lighting the yard for night operation.

"Sewer Maintenance Yards and Shops." By A. A. Appel, Supt. of Sewer Maint., Los Angeles, Calif. *Public Works*, July.

Secondary Treatment Without Primary

Miami, Fla. is building a 47 mgd treatment plant on an island about two miles off shore with an outfall into the ocean over 6,000 ft. long. The site of the plant was a swamp and muck, hopeless for a foundation. The surface was raised to 10 ft. above sea level by pumping material from the sea bottom and all structures will rest on piles driven about 16 ft. to limerock. The treatment will be high-rate activated



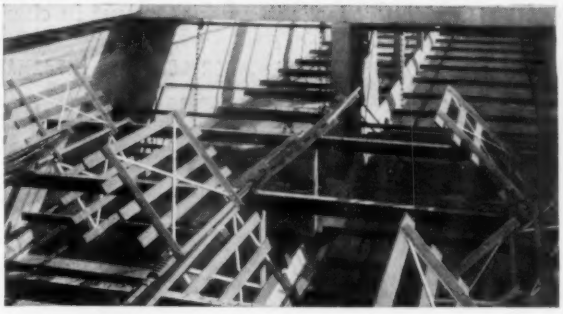
Little Miami Sewage Treatment Plant is first in Cincinnati's four-step, $50 million program to prevent pollution of the Ohio River.

It's LINK-BELT collectors and mixers at Cincinnati's new sewage treatment plant

BECAUSE the 900-mile Ohio River is the water supply as well as waste outlet for many communities in the eight states bordering it, Cincinnati's sewage disposal problems had to be resolved with consideration for downstream cities. Havens and Emerson, Cleveland consulting engineers, chose Link-Belt mixing-settling equipment.

The outcome: a treatment system designed for almost complete removal of settleable solids . . . 45 per cent removal of total suspended solids, estimated at 250 parts per million . . . 65 per cent B.O.D. reduction of raw sewage with 270 parts per million. While present flow is 18 mgd, actual capacity is 29 mgd, expected to be reached about 1980.

In both breadth of equipment line and depth of experience, Link-Belt is well qualified to handle your sewage treatment requirements—be they large or small. Our sanitary engineers will be glad to work with your engineers, chemists and consultants to provide the finest in modern water, sewage or industrial liquids treatment.



Link-Belt Straightline mixers and collectors in flocculation compartment (foreground) combine to provide maximum solids removal in shortest time. Link-Belt 30 and 48-in. belt conveyors are also used in processing sludge.

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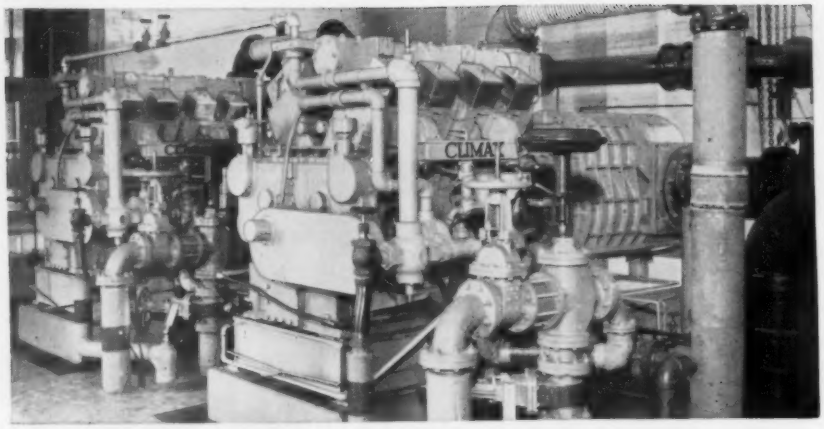

YORK, PENNSYLVANIA

The York, Pennsylvania, activated sludge type sewage treatment plant, serving 90,000 persons in York and surrounding communities, employs 3 Climax Engines.

The two engines pictured are Climax 8 cylinder V-Type, 7 x 7 sewage gas engines direct connected to 3500 CFM blowers requiring 149 H.P. at 790 RPM.

The third engine, not illustrated, is a Climax 12 cylinder V-type, 7 x 7 sewage gas/gasoline engine which drives a 150 KW, 480 volt, 720 RPM generator. It provides electric power when sufficient gas is available and serves as a stand by unit in emergencies.

Climax Engines were selected because of their proven reliability and economy of operation.

Plant designed by and built under supervision of Albright & Friel, Inc., Philadelphia, Pennsylvania, Consulting Engineers. B. F. Rockecharlie is superintendent in charge of operations.

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sludge, without primary treatment, except screening at the pumping station on the mainland and an aerated grit chamber. This was thought to be practicable because the sewage is weak because of heavy infiltration in the 200 miles of sewers. Also, because of the long distance traveled and the high temperature, it might become septic if held in sedimentation tanks. If primary treatment should prove to be necessary it can be added later. The plant effluent is expected to contain 25 ppm suspended solids and 20 ppm BOD, and will be chlorinated.

"Island Swamp Makes Ideal Sewage Works Site." *Engineering News-Record*, June 23.

Disposing of Domestic Wastes at a Profit

The author sees economy in handling sewage, garbage and refuse in one coordinated process. The sewage effluent and digester gas could be used as algae food, the algae using the CO_2 from the gas and nitrogen and phosphorus from the effluent, leaving the combustible portion of the gas for power generation to run the plant. The garbage, refuse and sludge would be combined aerobically into compost producing organic fertilizer. Another suggestion for the effluent is growing rough fish, for which there is a market as cat food, etc. Using figures of quantities as produced at Oklahoma City, he calculates that 40,000 lb. of fish per year could be grown, yielding $10,000 profit. The city's garbage and refuse contains 150,000 tons of organic material annually, recoverable by aerobic composting to produce 200 tons of fertilizer per day, worth $4,000.

"New Horizons in Biological Treatment of Domestic Wastes." By George W. Reid, Assoc. Prof. of Civ. Eng., Univ. of Oklahoma. *Public Works*, July.

Other Articles

"Operation and Maintenance of Sewer Systems." By LeRoy W. Van Kleeck. Wastes Engineering, June.

"Increasing the Efficiency of **Percolating Filters.**" Discussion by the Institute of Sewage Purification, England. The Surveyor, May 21.

"A Funnel Type **Stormwater Inlet.**" A new type developed at the Univ. of Illinois, capable of handling 2.8 cu. ft. per sec. without ponding or flooding. By Norman W. Nester and Prof. C. Guillou, Univ. of Illinois. Public Works, July.

The Lawn Sprinkling Load

This is an abstract of a paper by Edward F. Tanghe, Supt., Milwaukee Water Works, at the recent AWWA convention.

THREE factors tend to make the lawn sprinkling load more acute: (1) Consumers are moving from the older, more congested areas to the outskirts and the suburbs. This means longer distances for the water to travel from the pumping stations to the consumers. (2) Invariably, the lots in the newer areas are larger, with more expansive lawns. (3) The new areas, as a rule, are higher in elevation. This makes most difficult the maintenance of good pressures during peak demands.

Most lawn sprinkling in and around Milwaukee is done between the evening hours of 5 and 8. Following a number of dry days this lawn sprinkling creates a demand which at times has equaled half the capacity of the plant, but this high peak rate may not occur more than two or three times a year. The amount of water used for this purpose totals only about 2 percent of the annual pumpage which makes lawn sprinkling a very uneconomical use of the water plant.

Milwaukee has decided that holding half the plant capacity available for this infrequent use was entirely unwarranted and has tackled the problem in two ways. Large storage units have been and are being installed at some distance from the pumping stations. These units are filled overnight at the normal pressure in the distribution system and are emptied into the distribution system on a hot day by means of large-capacity pumps. In this way the peak demand on the filter plant, pumping stations, and large feeder mains is reduced very materially. The large storage units are in use in summer only. In addition, mild sprinkling restrictions, in effect since 1948, have cut the peak demand in the high service area from 3.8 times the yearly average to 2.5 times the yearly average, making one-third of the plant capacity available for expansion or other uses. There is no reduction in the total use of water lawn sprinkling.

The pumping from the storage units has further reduced the demands on the major pumping stations so that on a peak day the highest demand is twice instead of three or four times the yearly average. The saving in plant capacity is apparent.

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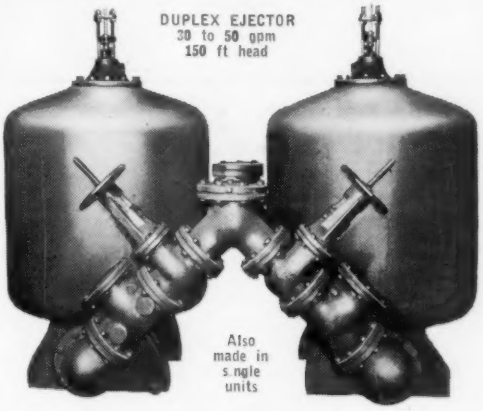

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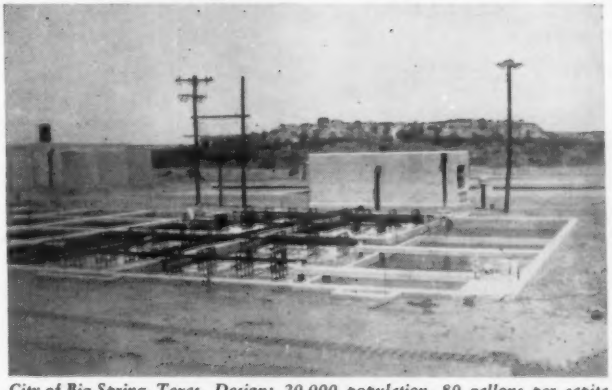

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The HIGHWAY AND AIRPORT *Digest*

Tar-Rubber Pavement At Homestead Airbase

Under construction at Homestead Air Force Base in southern Florida is a 1,150 x 8,000-ft. apron, taxiways, etc., and 1,000 ft. of tar-rubber surface at either end of the 11,400 x 200-ft. runway. The only previous use of tar-rubber by the Corps of Engineers has been at Bangor, Maine. Its use here will permit study of operation experience under widely different climatic conditions. The tar-rubber blend used is a synthetic rubber product of U. S. Rubber Co. It is batched at a temperature limited to 250° maximum, the only special requirement for handling tar-rubber instead of asphalt.

"Homestead Airbase: Vast Apron, Fast Paver, Tar-Rubber Mix." *Engineering News-Record*, June 16.

A Structural Plate Bridge Floor

In Limestone Co., Ala., are some old highway bridges with wooden floors, but otherwise adequate for traffic. These floors have to be continually repaired and replaced, and in the case of two bridges have been replaced recently with structural plate bridge flooring. One bridge is 79 ft. long and 18 ft. wide; the other is 60 ft. long and 18 ft. 11 in. wide; a total of 2562 sq. ft. The flooring, of 12-gauge steel, cost $1.06 per sq. ft. The total cost of material and welding in place on the steel beams, followed by a concrete surface, was $1.32 per sq. ft. This treatment eliminated rattle and shake.

"Structural Plate Bridge Flooring Eliminates Shake, Rattle and Roll." By H. C. Mabry, Co. Engrg. *Public Works*, July.

Standardizing Equipment Units

Asked if they considered it advantageous from the standpoint of economy and better operation for county highway departments to standardize on one manufacturer's equipment, most of the county highway officials replying agreed that standardization would be beneficial in so far as stocking of repair parts and equipment operation and maintenance are concerned. But some state laws require that counties advertise for bids on purchases exceeding a certain amount, and when the lowest bids are accepted it is impossible always to purchase the same make of machine. Some counties can accept the best, but not necessarily the lowest, bid, which makes it possible to buy equipment units that fit in with the existing fleet. However, some county officials think standardization would eliminate competition between dealers and consequently the cost of the equipment would increase. Also, a department can not know what make of machine will do the best and most economical job for them until they have tried them out,

Pneumatic Roller Helps in Street Resurfacing Work

THIS PICTURE shows a Bros SP-54 self-propelled, all rear-wheel-drive pneumatic tired roller compacting asphalt streets in Minneapolis. The self-propelled roller is reported as advantageous for operation on heavily traveled streets, where turn-arounds are impractical and in many cases impossible. A 2½" to 3" binder is laid over cobblestones and street car tracks followed by a 1½" to 2" wearing course which is then sprayed with emulsified asphalt and covered with ¼" granite chips. The self-propelled roller is used after each of these applications. Wheel oscillation compacts the material into the cracks and crevices of the cobblestones and around the car tracks. Perhaps the greatest advantage is the ability to roll evenly the feathered edges to meet the old asphalt surface.

According to Carl Danielson, foreman of the asphalt crew: "The kneading action of the rubber tires imbeds the coarse stony material bringing the finer material to the surface. A few passes with the pneumatic tired roller and the difference is readily noticeable by a smoother, less porous surface."

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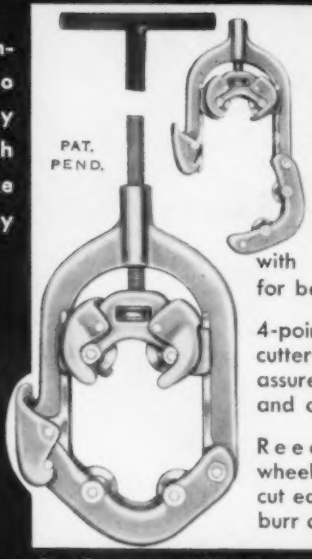

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"Standardize on Equipment Units?" *Better Roads,* June.

Slag Aggregate for Hot Bituminous Mix

Gregg County, Tex., owns its own continuous-mix asphalt plant. It is thought that this is the first plant in Texas to use slag aggregate as a hot-mix bituminous material. The county obtains its slag from steel mills near enough to the asphalt plant to permit direct delivery by truck. The slag used ranges in size from 200-mesh dust up to 5/8 in. In the mix, 65 percent is slag, crushed gravel is 15 percent and field sand 15 percent, with 5 percent asphalt.

"County Uses Slag Aggregate in Paving Mix." *Better Roads,* June.

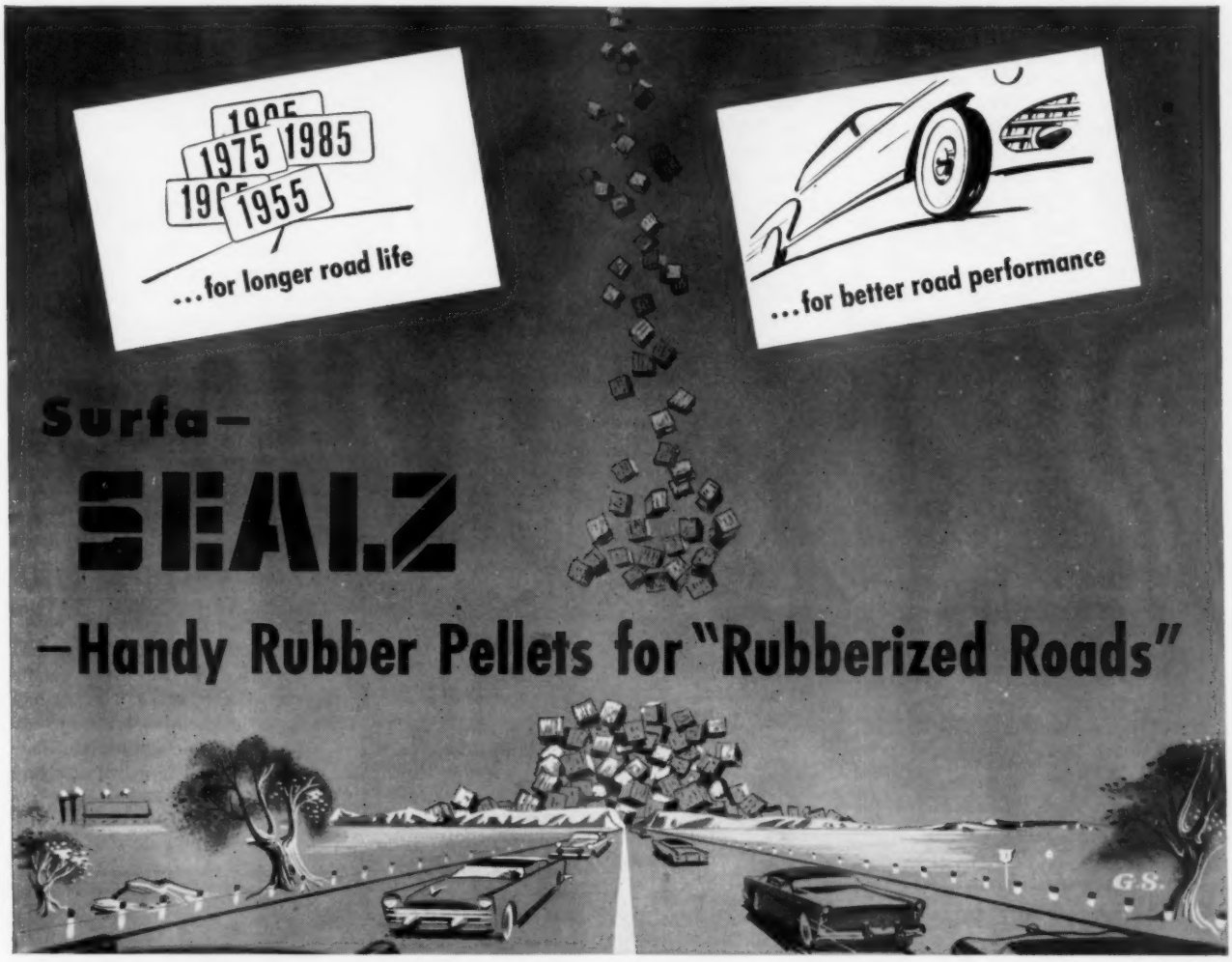
Soils Data Obtained By Michigan Highway Dept.

The Michigan highway department obtains subsurface information of seven classes: 1—Soil classification surveys; 2—rock soundings; 3—resistivity surveys; 4—hydraulic borings; 5—muck soundings; 6—continuous flight auger borings; 7—laboratory test results. Shear strength values are obtained to decide whether spread footings or piles should be used for bridge structures, and also for computing the size of footings or size and number of piles. All information obtained is available to contractors; which practice has proved to be a sound philosophy as reflected in better quality construction, lower cost, and more expeditious contract performance. The confusion of working in the dark has all but been eliminated, the mutual understanding of the problems involved between the contractor and the department has been greatly improved. Disputes that inevitably arise from unclassified earthwork construction are avoided. The article describes the tools and methods used.

"Advance Borings for Soils Data." By W. W. McLaughlin, Testing & Research Eng'r. *Roads and Streets,* June.

Use of Radar Reduces Traffic Accidents

Since April, 1954, Hammond, Ind., has been using a radar device to detect speeding and, by preventing speeding, reduce the number of accidents on its highways. As a result, the number of traffic fatalities was only 9 last year as compared to an average of 25 for the past



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twenty years. On one road there had been an average of 6 deaths a year, but in the eight months of last year when radar was in use there were none. The squad cars carrying the two units of the radar equipment are moved from street to street during 16 of every 24 hours, covering six to eight every day. All speed limit signs in the city bear the words "Radar Enforced," and the use of the device is given the widest publicity. The aim is to prevent speeding, and detecting and punishing it is only a means to that end.

"Radar Reduces Accidents in Hammond." By Phil Hirsch. *Public Works,* July.

Equipment Wanted By a Turnpike Contractor

The contractor's first requirement in equipment is reliability. His second is reserve horsepower to enable the equipment to do its job under adverse conditions, ample strength to take unexpected shock or strain. Such additional reserve will cost more, but contractors are interested not in first cost but in final cost. Ample reserve built into the product means lower maintenance, less down time and correspondingly lower unit cost. The third requirement is capacity. Turnpikes generally mean large quantities. Labor cost, including the fringe benefits, etc. have risen so high that unit production must be increased to keep construction cost in line. The author believes that within the next five years 4-yd. shovels will be as commonplace on highway work as 2½-yd. shovels are today. He urged manufacturers to design and market an over-the-road truck tractor and low-boy trailer with enough aluminum or alloy components to help overcome gross weight limitations now in effect on our highways. . . Equipment should be adequately field tested by contractors before marketing; the so-called test farms don't begin to reflect a contractor's usage.

"Organizing and Operating a Turnpike Job." By Nello L. Teer, Jr. *Roads and Streets,* June.

Maintenance of the New Jersey Turnpike

This 118-mile dual pike is divided into three maintenance divisions, each with two district foremen. A central shop, traveling central shop mechanics, and division shops maintain the 258 equipment units. A special electrical-mechanical team covers the entire turnpike, maintaining lighting, water and sanitation facilities, etc. Preventive maintenance of equipment is emphasized. As an example of mechanization, salt trucks are mechanically loaded, salt is spread on 7-mile patrols using spreaders operated mechanically from the driver's seat. The roadside grass-cutting program is speeded by mowers which can ride 2:1 slopes, with gang mowers for 16-ft. swath.

"Maintenance and Patrol Methods on New Jersey Turnpike." By Charles M. Noble, Chf. Eng'r, Turnpike Authority. *Roads and Streets,* June.

Electronic Highway Scales

The Iowa and Oregon highway departments are collecting traffic data by means of a new device—electronic scales that record the weights of vehicles while they are in motion passing over them; with an error of about 2%, an accuracy sufficient for highway planning, according to an official of the Bureau of Public

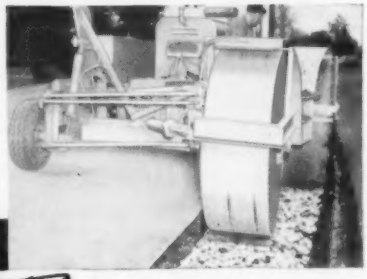
BLAW-KNOX ROAD WIDENER
Spreads 500 tons per day!

This job really rolled for D. E. Smith, Inc. of Mifflin, Pa. Their contract called for widening 3/4th of the stretch from 18′ to 22′, and the balance from 20′ to 24′, spreading 2″ of fines in the bottom of a 3-ft. wide trench and, after compaction, spreading 10″ of No. 4 crushed stone on top of the fines. *The Blaw-Knox Model 95 Road Widener, spreading 500 tons per day, widened approximately 3200′ of highway every 10 hours!*

In addition to speeding operations, Blaw-Knox Road Wideners also lay concrete without forms, handle asphaltic concrete, dirt, gravel, stone or any kind of aggregate. They handle any widening job from 2′ to 10′ widths. They have many other time and money saving features your Blaw-Knox distributor will gladly explain. Call him today.

BLAW-KNOX Dual Compression Trench Rollers

Here's the most flexible and economical trench roller on the market! Width range can be accurately adjusted from a minimum of 20″ to a maximum of 39″, or any intermediate width. The two full-width, 60″ high rolls, used either "dogleg" or tracking each other, *are the equivalent of two separate rollers.*



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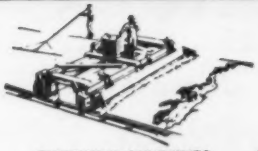
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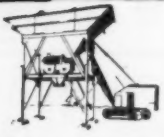
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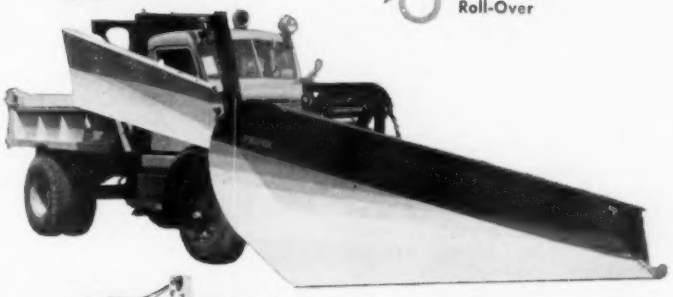
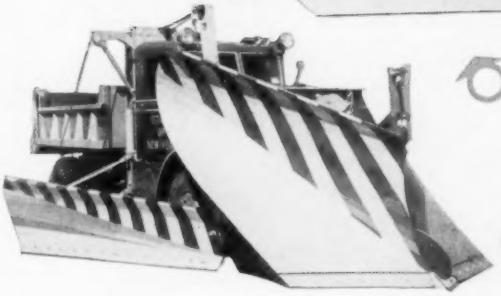
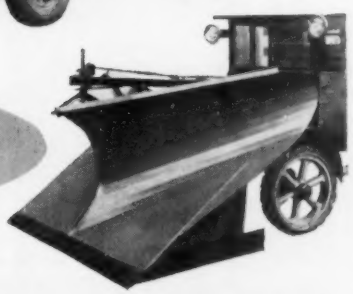




One-Way

V-Type

Reversible



Here is one of the first "shovel nose" V-Type plows made of steel at Frink's—even then, as now, the leader of the industry.

Since Carl Frink made the first all-metal snow plow at Clayton, New York, 35 years ago, Frink Sno-Plows, Inc. has been foremost in the industry. Farsightedness and the courage to be the leader have always motivated every major improvement or innovation in design.

The name FRINK on a snow plow means that years of pioneering research have preceded the plow's manufacture, and only after the new model has had the severest tests under actual conditions does a plow become available for public sale.

Proof of leadership is the fact that down through the years these snow plow developments have been copied by the rest of the industry, but Frink pioneering always stays ahead.

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Is manhole sniffing a lost art? Regardless of gadgets, electronic robot analyzers, chemical or physical methods, there is no danger in the foreseeable future of supplanting the nose as the principal and final method of odor evaluation.

Odors are generally mixtures of several compounds and one more powerful than the others masks the rest. A unique form of concentration while sniffing helps determine the various component osmyls (odor compounds). A manhole sniffer is just another way of saying that you are an expert in the art of olfaction.

Full recognition is now being awarded to all sewage operators who possess this talent with the formation of the **Loyal Order of Manhole Sniffers.** An engraved certificate with your name and membership card will be forwarded to all sewage plant operators without cost.

The BIONETIC* method eliminates odor and grease without the use of chemicals toxic to the sewage treatment process. Safe, simple and economical. Bionetic requires no rigid controls, feeding equipment or special labor.

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Roads. It also records speed and axle spacing. The weighbridge is visible only as another crack in the pavement. Not only does the driver not have to stop his truck to be weighed, he may not even know that it is being weighed.

"Highway Planners Study Electronic Scale Results." *Public Works,* July.

Rock Salt Stabilization In Genesee County, N. Y.

This county finds that rock salt stabilization provides maintenance of gravel roads with minimum work and expenditure. Since 1950 it has used this method on all of its gravel roads, as have all the towns in the county. The only equipment it requires is for scarifying, blading, watering and rolling. The county uses an A-shaped crown, with a slope of ½ in. to the foot in a maximum wet season; with this instead of a rounded crown there is not so much chance of flattening at the center, water collection and formation of potholes. One section of county road that carries heavy trucks formerly required blading 8 or 9 times a season, and has lost 8 inches of gravel; but during a year since salt stabilizing it no blading has been necessary.

"Holding Our Own With Rock Salt Stabilization." By Robert T. Carrier, County H'way Supt. *Public Works,* July.

Other Articles

"Building Bridges With Paper Tubes Saves Money." By W. J. Lutz, State H'way Com'n of Kansas. Public Works, July.

"The Development of **Soil-cement Stabilization** Processes and Plant at the Military Engineering Experimental Establishment" (of England). By Col. F. H. Maclennan. Roads and Road Construction, May.

"Helena Uses First **Soil Cement** in Montana." By Henry Rolfes, Jr., City Manager. American City, June.

"First Year's Savings Will Pay For Our **Asphalt Equipment;"** $2.00 per ton saved on 41,000 tons of blacktop. By Robert J. Robillard. Eng'r Cass Co., Mich., Road Com'n. Public Works, July.

"Rest Stops Made Easier Along Wisconsin's Roads." By William F. Steuber, State H'way Com'n. Better Roads, June.

"How **Federal Aid** Secondary Plan Works." By A. C. Leonard, B.P.R. Better Roads, June.

"Missouri Modernizes Its **Striping Machine."** By Leon W. Corder, State H'way Dept. Better Roads, June.

English Pollution Research

(*Continued from page* 108)

change in anionic detergent might occur during the time of passage through a sewage-treatment works and that after this change the material might still react as it did originally in the Degens test, which is by no means a specific one. To examine this point experiments are being made in which detergent-free sewage, and similar sewage to which detergent has been added, are treated in pilot-scale percolating filters, the effluents then being examined for toxicity and for concentration of detergent as determined by the Degens method.

Surface Water from Housing Estate

The examination of the quality of surface run-off water from the London County Council estate at Oxhey, Hertfordshire, was continued for one year. The estate, which is sewered on the separate system, has a total area of 611 acres, assumed to be equivalent to an impervious area of 215 acres. Data on the volume and composition of run-off water were obtained during 79 of the 131 known storms; the samples collected represented nearly 20 million gallons of run-off water, or about one-quarter of the theoretical run-off calculated from the total rainfall and the assumed impermeability factors of the different types of surface in the estate. The dry-weather flow below about 3 cubic feet per second, and the run-off at the end of long storms, were not collected.

It was observed, as might be expected, that the more polluted run-off water was discharged in the early parts of storms; in this particular system of which the "time of concentration", as determined by the Road Research Laboratory, was about 20 minutes, the most polluted samples were usually those collected between 20 and 30 minutes after the first discharge of storm water from the outfall; on a time basis, therefore, what might be called the first flush of storm water was taken for this system to be the first 30 minutes of storm flow. It is calculated that, for half the storms sampled, the volume of water discharged during the first 30 minutes would have exceeded 55,000 gallons and that for the other half of the storms, the volume discharged in the first 30 minutes would have been less than this. A volume of 55,000 gallons represents

a run-off of 250 gallons per assumed impervious acre.

There was a fairly high concentration of suspended matter in the run-off water even after prolonged rainfall, but as judged by the average biochemical oxygen demand and permanganate value even the first flushes were not highly polluting. First flushes, judged on a time basis of 30 minutes, included 29 percent of the water between 43 and 50 percent of the polluting matter; if judged on a volume basis of 55,000 gallons, they included about 20 percent of the water and between 32 and 38 percent of the polluting matter. If it is assumed that the polluting matter discharged in each of the storms which were missed was the same as the average for the storms sampled, then the total weight of BOD discharged with the surface water during the year would be 2490 lb., and the total weight of suspended matter would be 62,700 lb.

The composition of individual samples varied between wide limits. The strongest sample had a BOD of 100 ppm, and a permanganate value of 63 ppm, and it contained 1791 ppm suspended matter; the highest observed concentration of suspended matter was 2045 ppm. The composition of the run-off water would no doubt be affected by numerous factors, for example the activities of people living and working on the estate and seasonal and chance variations in the weather. The effect of many factors could not be satisfactorily evaluated in a single series of observations, but the results obtained seem to show that the polluting character of the run-off water, as judged by the BOD, was influenced by the length of the period without rain which preceded any given storm. For example, the average BOD of the first 55,000 gallons of water from storms occurring within one hour of the previous storm was about 8 ppm and this value tended to increase by about 3 ppm for each 24 hours of dry weather before the storm, until the length of the dry interval reached 8 to 10 days beyond which little further change was indicated by the few results available.

Treatment of Sewage Containing Synthetic Detergents

There have been reports that it has become more difficult to treat sewage since washing powders containing synthetic detergents were introduced as a substitute for soap. There still appears, however, to be little quantitative information on this matter, though some controlled tests have been described in the literature. A little work on the subject has been done at the Laboratory and, although it is clear that much work is required, it may be of interest to discuss the results so far obtained.

In one experiment two percolating filters, each 6 ft. deep and 1.42 ft. in diameter, were used. At the Laboratory at Watford the domestic sewage — from which laboratory wastes were excluded—flowed to a cesspool which was emptied periodically. During the period of the experiments the use of mixtures containing synthetic detergents was prohibited, and sewage taken daily from the cesspool was treated in the two filters at a rate of about 60 gallons per cubic yard of medium per day. After the filters had matured, measured quantities of equal parts of seven proprietary brands of washing powders containing synthetic detergents were mixed with the sewage applied to one of the filters; the concentration added was equivalent at first to 5 parts, and later to 10 parts, sodium lauryl sulphate per million. The purpose of

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the experiment was to determine the toxicity of the two effluents to fish but samples were also taken daily for analysis.

Under the conditions of this experiment, effluents of very good quality were obtained and the presence of the detergents caused no change, either in the biochemical oxygen demand or the degree of nitrification. When the concentration of detergent in the settled sewage was equivalent to 5 parts sodium lauryl sulphate per million the concentration in the effluent was about 2 ppm and this increased only 2.5 ppm when the concentration in the sewage was doubled.

An experiment on a larger scale was made with the co-operation of the London County Council. This work was done at a school with a day-time population of 95, of whom 75 lived permanently on the premises. Sewage, including some laundry waste, was treated in a works which included a large sedimentation tank (period of retention about 35 hours) and a percolating filter operating at an average rate of about 52.5 gallons per cubic yard of medium per day. During the first half of the summer term no synthetic detergents were used in the school; during the second half they were used freely. From records of the quantities used it was estimated that during the second period the average concentration of detergent (calculated as sodium lauryl sulphate) in the sewage should have been 7.8 ppm. The average concentration found by analysis in the settled sewage was about 2.3 ppm. It was found that when synthetic detergent was not being used in the school some appeared to be present both in the settled sewage and in the final effluent. It is not known whether this was due to the inaccuracy of the method of analysis (the Degens method) or whether it was due to the washing out from the plant of detergent which had been used before the experimental period. When detergent was being used in the school, the concentration in the settled effluent from the plant was about half the concentration in the settled sewage. Taking account only of average values the quality of the final effluent was poorer when synthetic detergent was being used than when it was not. There were, however, considerable variations in the individual analytical results during both the periods of the experiment, and making allowance for these, apparent differences in the results between the two periods were not statistically significant.

• • •

Selling Sewage Sludge as Fertilizer in Toledo

Sewage sludge produced by the Toledo, O., plant is processed and sold as fertilizer. In 1954, a total of 823.5 tons were produced at a cost per ton of $6.47. This was sold at a sliding scale, ranging from $1.50 per bag in lots of six bags or less to $17 per ton for 50 or more tons. The net profit, exclusive of overhead and fixed charges, for the year was $8,-201.40. The sludge is dried on glass-covered beds, ground and bagged. A. H. Niles is Commissioner of Sewage Treatment and Elmer Pollex is Superintendent.

Measuring Paint Thickness

The use of magnetic type meters for measuring paint thickness has proven successful in producing more uniform and effective protective coating on California state highway bridges, according to California Highways and Public Works.

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TAILGATE SPREADER

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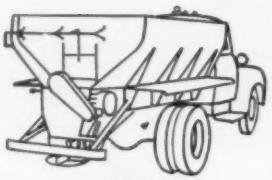
The Model DD Tailgate Spreader answers all your spreading problems. In the winter months it is used for ice control, spreading sand, cinders, salt, and similar materials. In the summer months it is used for seal coating — applying sand or chips on newly laid oil and spreading calcium chloride for dust control. The Model DD Tailgate Spreader clamps on to the tailgate of an ordinary dump truck in minutes. A uniform and even spread is maintained at speeds from 1 to 35 m.p.h.



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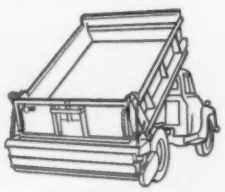

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Designed for the Community of Distinction

Quite frankly, fluorescent street lighting is designed for the above-average community. For fluorescent is the signpost of progress and prosperity. It's a symbol of a town with pride—pride in its people—pride in its government—pride in its hospitality—pride in its capacity to cast aside the old and embrace the new.

This is street lighting that says to the world—here is a good place to live, to work, to play, to shop, to invest. Here is a city well-managed, clean, attractive—a Community of Distinction.

For those fortunate cities whose officials are alert to progress, General Electric offers its services to assure the finest fluorescent street lighting any city can install.

The full story of G-E fluorescent street lighting is told in a new bulletin, GEA-6094. You can get a copy from your nearest G-E Apparatus Sales Office, or by writing to Section 452–159, Outdoor Lighting Department, General Electric Company, 1400 Western Avenue, West Lynn 3, Mass.

"Out of Darkness," a new, dramatic film story of how one community met its street lighting problems, is now available for showings to civic groups, community service organizations, etc. This 16-mm, sound, black and white movie runs 26 minutes. Borrow a print of "Out of Darkness" from your nearest G-E Apparatus Sales Office.

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The attractive new outdoor Beachwood Swimming Pool in Pittsburgh, Pennsylvania is one of the finest examples of modern pool design. Its 328,000 gallon capacity is kept invitingly clear with Adams Poro-Stone Filters.

Another Modern Pool with ADAMS *SPF* Filters

Yes, here's another distinctive pool with the popular Adams Poro-Stone filters. And, there are some good reasons why more and more public pools are insisting on Adams.

First, the exclusive ADAMS HI-FLOW backwash design gives you simple and easy cleaning . . . no messy disassembly . . . no scrubbing of filter elements. The high air dome and unrestricted backwash outlet provide complete purging of the filter tubes with high velocity water.

Second, permanent PORO-STONE elements with nearly 40% open area are unaffected by corrosion. The first Adams swimming pool filter — in use since 1938 — still has the original PORO-STONE tubes.

There are numerous other reasons why it pays to *specify* and *buy* Adams SPF filters. Get all the facts by writing for your copy of Bulletin 625. Use the handy coupon below.

R. P. ADAMS CO., INC.
228 EAST PARK DRIVE BUFFALO 17, N. Y.

This triple SPF 169 can handle up to 730,000 gallons capacity and is ideally suited for community pools such as is shown above.

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Please send me by return mail your new Bulletin 625.

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Size of pool is.....gallons.

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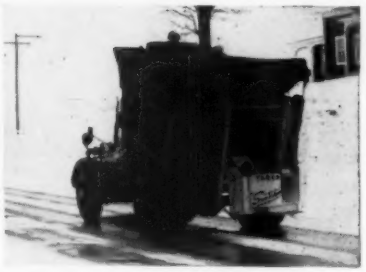
FASTER

On or off any truck body in 5 minutes . . . cleans roads 8 times faster than with treated abrasives.

LESS COST

Exclusive "Bird-Shot" pattern uses less than 1 oz. of chemical per sq. yd. . . . assures maximum melting . . . no man-on-the-back!



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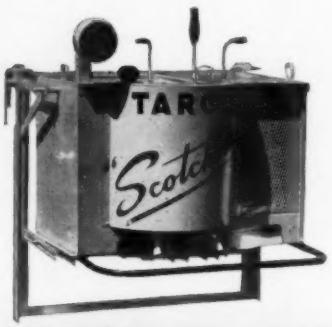
Scores of street, highway and sanitation departments use this cab-controlled, self-leveling, electric starting spreader. Weatherproofed . . . self-contained hydraulic control . . . one point lubrication . . . stainless steel construction.



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APWA Chapters Elect

(*Continued from page* 112)

Francis Robinson, Staff Engineer of the Bell Telephone Company of Pennsylvania, First Vice President; David M. Smallwood, Chief, Bureau of Highways, Second Vice President; W. E. A. Doherty, Assistant Chief, Bureau of Highways, Third Vice President; Earnest R. Brooks, Assistant Chief Engineer, Bureau of Surveys and Design, Secretary; and Harold H. France, Assistant Engineer, Water Department, Treasurer.

Charles W. Cooke, Director of Public Works of Hartford, Connecticut was elected President of the **New England Chapter** at its recent annual meeting. George J. Maher, Director of Public Works of Lewiston, Maine was named Vice President, while Howard F. Carpenter, Chief of Sanitation of Providence, Rhode Island was reelected Secretary-Treasurer. The **Minnesota Chapter,** at its recent meeting in Albert Lea, elected C. E. Dahlgren, City Engineer of St. Peter, President; Frank Marzitelli, Commissioner of Public Works of St. Paul, Vice President and Everette Enns, City Engineer of Willmar, Secretary-Treasurer.

The **Northern California Chapter** installed John A. Morin, City Engineer of Oakland, as its new President at its last monthly meeting. Other officers installed for the 1955-56 term were John L. Kergel, Senior Highway Engineer, California Department of Public Works, San Francisco, Vice-President; and O. E. Anderson, Chief Deputy Surveyor, for Alameda County, Secretary-Treasurer. Results of the mail-ballot election conducted by the **San Diego-Imperial County Chapter** reveal that Virgil L. Larson of the Pacific Telephone and Telegraph Company of San Diego is the new President of this fast growing Chapter. John W. Davis, Assistant Commissioner of the San Diego County Road Department was named Vice-President, while the Secretary-Treasurer's post went to Warren A. Barney, Chief of the Engineering Division of the San Diego County Public Works Department.

• • •

Bus Company Subsidized by City

Fort Collins, Colo., will subsidize the private bus company operating there to the extent of supplying gasoline up to 2,240 gallons a month. Cost to the city will be about $500 a month.

World's biggest mental hospital speeds garbage disposal, dirtmoving with Tournapulls

Milledgeville State Hospital at Milledgeville, Georgia, is one of the largest institutions in the world for treatment of mental diseases. Some 11,000 patients are under care at all times. The hospital and its 3 farms cover over 10,000 acres.

To maintain and develop this large area, Milledgeville keeps a fleet of dirtmoving equipment busy 8 hours a day, 5½ days a week. "Our D Tournapull," says Farm Supt. R. H. Lawrence, "is the handiest piece of equipment we have for farm construction, grading, and moving dirt."

"We don't need a transport for the Tournapull," Mr. Lawrence continues. "It's so fast we can go the 7 miles to the farms and be working while they're still preparing a crawler for transport."

With this high travel speed in traffic (up to 28 mph), plus ability to work profitably either as a self-loading tool or with a pusher, hospital authorities use the "D" for such jobs as:

1. *Grading and building roads* around hospital and farm. Self-loading average of 5 pay yds. in typical Georgia rocky red clay, "D" spreads gravel over roadbeds. It travels 3 to 4 miles from pit at 20 to 28 mph.

2. *Leveling hilly land* for building sites. "D" works on grades that range up to 30%.

3. *Building levees.* "D" with its long haul range uses excess dirt from other excavating operations or works from borrow pits to raise levees for protection of fields, highways and railroad tracks.

4. *Handling garbage disposal.* Tournapull digs ditches . . . then uses its electrically-controlled blade to doze truck-dumped refuse into the ditches and to spread cover dirt. In this way, odors and pest-breeding danger of an open dump are eliminated.

5. *Grading, leveling and terracing.* Accurate cutting and spreading control make "D" an excellent tool to develop farm fields for better drainage and soil conservation.

6. *Covering old ditches and eroded areas.* This handy go-anywhere excavator increases farm output by putting idle acres back in production.

7. *Pulling pickup trucks out of mud.* According to Supervisor Leo Combes, 122 hp Tournapull does job as well as crawlers, and has the big advantage of being able to get to the emergency site much faster.

The speed, power, and self-loading ability of the D Tournapulls can be important factors in increasing your production and lowering your costs, too. For job-proved figures on work like yours, see your LeTourneau-Westinghouse Distributor.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-427-P-z

LeTourneau-Westinghouse Company

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GARBAGE COOKING in IOWA

E. ROBERT BAUMANN, Ph.D.,

and M. T. SKODJE

AN IOWA law, which became effective in June, 1953, requires the cooking of garbage fed to animals. The Iowa Department of Agriculture has the responsibility for enforcement. Regulations issued by the department state that garbage to be fed to swine in the State of Iowa shall be cooked or heated to 212° F. for 30 minutes by one or more of the following methods: (a) Wet steaming or boiling in an open vat; (b) dry steaming or boiling in a jacketed kettle; (c) steaming in a pressure cylinder; (d) steam boilers; or (e) direct heating over an open fire.

A survey of the garbage-cooking installations in Iowa was made recently by Iowa State College personnel with the cooperation of the U. S. Bureau of Animal Industry. The survey provided information on the types of cooking methods being used in the field. This information was used as a basis for the selection of equipment to be used in laboratory studies that the engineering experiment station and the division of veterinary medicine at Iowa State College are now conducting on methods to cook garbage. The project, titled "The Survival of Swine Disease Organisms in the Heat Treatment of Garbage," is being conducted under a grant from the National Institutes of Health.

Garbage Feeders in State

Up to the time when the law went into effect, there were more than 400 garbage feeders in the State. Most feeders ceased feeding for several probable reasons: First, little was known about methods of cooking garbage; second, many feeders doubted that garbage could be cooked economically; and third, many feeders doubted that the cooked product would be eaten by the hogs. The number of feeders operating under the new regulations has gradually increased until by July 1, 1954, 13 months later, 60 were again feeding hogs. Since most garbage feeders in Iowa feed garbage as a sideline, they are comparatively small-scale operators.

As of July 1, 1954, 52 private feeders had been licensed to process garbage for hog food. In addition to the private feeders, there were 8 garbage-processing installations located at Federal and State institutions, which do not require a license.

All of the garbage feeders collect, process, and feed commercial garbage, collected principally from restaurants, hospitals, hotels, food markets, and dormitories. Two feeders collect residential garbage and feed some of it along with the commercial garbage. Some handle a restricted type of garbage. Two feeders handle chiefly bakery-dough wastes, and two handle beef or swine offal and bones. The fuel costs vary from a negligible amount for the operator using scrap wood and tires from 0.5 to 1.5 cents per hog per day for those operators using oil, kerosene, or bottle gas for fuel.

All of the feeders interviewed indicated that they were satisfied with the requirement that all garbage must be heated before feeding. They believed that feeding cooked garbage produced unexpected advantages in lower death losses and an ability to increase their herd size on the same amount of garbage.

On July 1, 1954, 5,275 swine were being fed in Iowa on heat-treated garbage. The average herd was about 88; the largest herd was 579 head, and the smallest was 26. During a normal month, about 1,000 garbage fed hogs are sent to market from these farms. During the maximum month 1,898 garbage-fed hogs were marketed.

Of the cookers used, 38 are direct-fired kettles; 17 employ direct steam injection; one has a dry steam coil and two have dry steam jackets; there is one pressure cooker; and one is of an undetermined type.

The costs of installing garbage cookers in Iowa have been estimated to range from $50 to $3,000. In most cases, little consideration was given to the labor involved in handling and transporting the garbage during and after cooking. As a result, the garbage frequently must be dipped from the cooking tank by hand and transported manually to the feeding troughs. An increasing number of cooking tanks are being provided with chutes and doors to reduce the handling of the garbage. None of the feeders uses grinding equipment to provide a more uniform garbage particle size, even though ground garbage would be easier to handle, would provide for more efficient transfer of heat, and would perhaps make more of the garbage available to the swine. Only two operators make any attempt to agitate the garbage artificially during cooking to secure more even heat distribution. The cost of the treatment is more than offset by increased income from their herds, for the hogs prefer the cooked garbage to raw garbage and eat a much larger percentage of it.

Conclusions and Comments

1. The Iowa law requiring the heat treatment of garbage resulted in a drop in the number of garbage feeders from over 400 to 60 feeders. The number of feeders cooking garbage has increased steadily, however, during the succeeding 13 months and may be expected to continue to increase.

2. A majority of the cookers are homemade installations which were not designed for maximum heating efficiency or for fuel economy. Commercial cookers are, however, becoming more popular.

3. The direct-fired cooker is used most frequently for cooking garbage. Direct-steam-injection cookers are also used and are becoming more popular.

4. All of the operators interviewed report that they have gained rather than lost under the new regulations.

5. Only 5,275 swine were being fed cooked garbage in Iowa on July 1, 1954. On January 1, 1955, there were 73 licensed feeders in Iowa, feeding cooked garbage to 8,236 hogs.

This an abstract of an article in Public Health Reports.

Most Useful Equipment Owned by Water Departments

In our July issue, we listed the most useful equipment as reported by a large number of water departments. A tabulation of the several hundred replies received since the first listing shows the following ten items of equipment rated as most useful.

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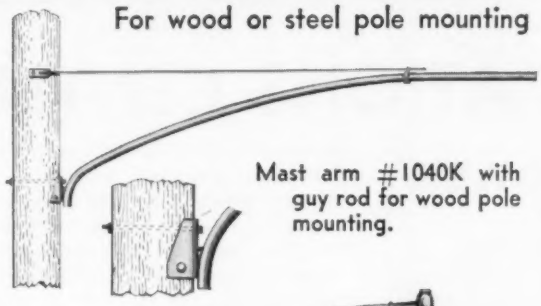

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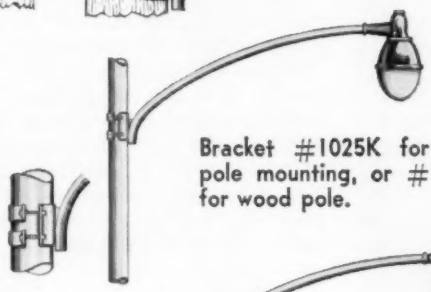

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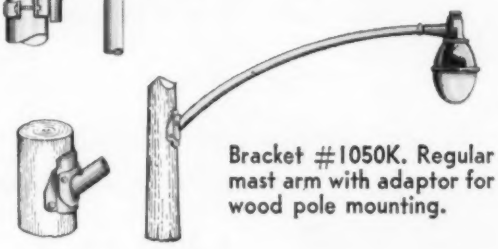

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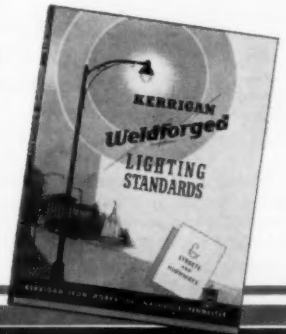

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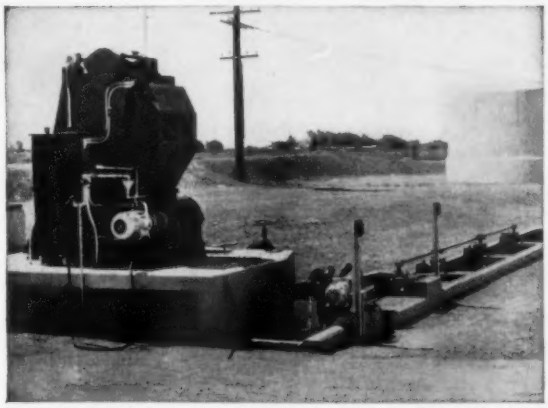

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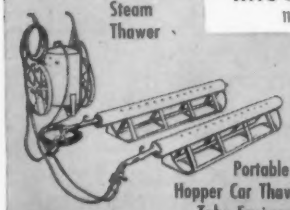
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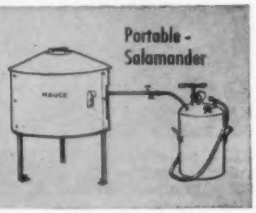
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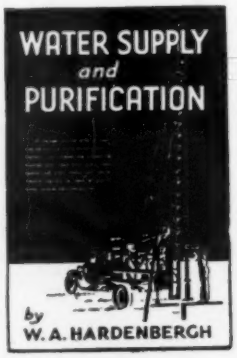

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Good Roads Don't Happen

(*Continued from page* 80)

we attempted to drain our roads adequately with culverts requiring sizes smaller than 72-inch diameter or equivalent culverts. The construction of the larger structures had to wait on more finances, unless it was imperative that it be built with the road.

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Following the grading program, we sold the idea to a cooperative public that we must have additional money for surfacing and they responded by entering into a cooperative community agreement to contribute one-half of the cost of surfacing of any specific road in which they were interested. It was through this plan that we made the spectacular increase in our surfaced mileage from 300 miles to 975 miles in eight years. Our problem now, since we have 88 percent of our farm homes on surfaced roads, is to connect the gaps such a program would necessarily leave, and give further assistance to the lone farmsteads not yet connected. Again, I point with pride to our cooperative spirit, as we are receiving no objection to the easing of our requirements. Those who paid 50 percent of the total cost are now willing that we give greater proportional help in the lesser populated territories.

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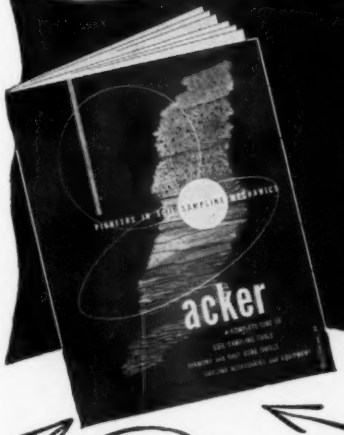

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The second section of this road will be given its single seal this summer after having gone through two years as an open base road. While it shows some wear, we believe that with a minimum of retouching, this road, after it receives its second seal, (the second construction season after the first seal) will also give us an economical, trouble free road.

In general, this is the story of Marion County and its highways. We hope our story will convince others with similar conditions that the counties are in a very favorable situation as far as freedom of operation is concerned. They are small enough that the Engineer has full and intimate control of every operation. This means he does not need to be bound so strongly by the "Book". (A necessary evil in operations as large as the state where the head of the department must depend upon literally hundreds of men of all qualifications to carry out his plan.) The County Engineer can adapt every situation of local material, equipment deficiency or excess, and local personnel experience to the job at hand and, with good engineering judgment, come up with economical roads that will serve the needs of his county. This we have tried to do in Marion County, Kansas, the best county in the State, and we believe our over-all road system speaks well of our efforts.

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To Meter or Not

(*Continued from page* 104)

$6 per installation. In the case of work performed for the Authority, they would be reimbursed in the amount of $3.75 per hour for a "team" and $2.25 maximum when the master plumber worked alone, the understanding being that we were aware that some jobs would cost more than others but that we felt the over-all cost should not greatly exceed $6. It was also indicated that the Borough reserved the right to utilize only such plumbers whose costs were considered reasonable and to employ out-of-town plumbers if progress was found satisfactory.

For the most part, our local plumbers did an excellent job for us and cooperated in effecting improvements in methods and in ironing out controversial problems. As indicated previously, one of our chief problems involved putting meters on old galvanized piping since frequently it was impossible to cut threads on such pipe. This problem was solved by the use of copper water meter yokes or copperhorns as manufactured by the Mueller Company and the Ford Meter Box Company. The cost of this item ran from $2.60 to $3.50. However, with this type fitting, labor costs were reduced over half from an average of over $4.00 without the fitting, to less than $2.00 with the appliance. In addition, by so doing, we minimized the possibility of being required to replace long sections of old pipe which might have been damaged by our installers.

Our chief source of complaint came from consumers living in some of the older (twin or double) homes where the service line had previously served both houses. This arrangement should not have been permitted in the first place because it hampered repair work, if and when required, and made disconnections for non-payment and for other reasons, impossible. These complaints were due chiefly to the costs involved for the new service connection required from the main into the house—from $150 to $250, with the Authority making no contribution whatsoever to these costs. In determining which side of a double house would require the new connection the Borough adjudged the owner of the premises on which the curb box was installed as being properly connected, thus requiring the other party to pay the entire cost of the new service line.

Strange as it may seem, complaints regarding greatly increased water costs under the meter plan were infrequent, even though there were quite a few locations where costs doubled and even tripled over the fixture charge. We feel that our publicity program paid dividends in this connection because the standard local answer to such complaints from our Councilmen and our fellow-townsmen was, "Better get those leaks repaired, I am getting tired of paying your water bills."

• • •

Eliminating Abandoned Driveways in Downtown Areas

Driveways that lead only to blank walls or display windows are being replaced in Phoenix, Ariz., with curb and gutter at the expense of the property owners; or, if not done within a reasonable time, the city does the work and charges it to the owner.

• • •

Douglas County Snow

(*Continued from page 93*)

zone basis with plows roughly assigned to an area subject to be moved if needed. Radio communication allows us constant control and coordination of all vehicles. In the event of emergency, the nearest plow can be dispatched immediately. With the county operating on the one unit system, this allows constant contact between the engineer and supervisor.

Although each area shop has its complement of snow plowing equipment, Waterville is the central shop for major repairs. Since our motor patrols serve double duty in construction and snow work, we sometimes have difficulty in finding overhaul time. Each shop has a mechanic for light repairs, while the Waterville shop has the heavy duty major mechanics who go anywhere within the county. For the plateau area, we have designed and constructed our own pushplows to fit local conditions. They have proven very satisfactory.

One thing we know—when the moon is a pale baleful eye over the Cascade Range, the snow scoots in spurting puffs across the roads, and there is the faint singing of the keening wind in the distance—Douglas County is in for a blow. And when the snow banked high on the shoulders melts in the spring, it is just good hard cash running down the drainages toward the Columbia River. The more snow, the more good money down the river.

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PUBLIC WORKS
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Published Monthly **August, 1955**

Filter Operating Table has Pushbutton Controls

A new waterworks filter operating table was introduced by Fischer & Porter at the A.W.W.A. convention. This table incorporates industrial-type instruments for indicating and controlling filtration and backwash. It is pneumatically and electrically operated throughout. The backwash cycle to clean the filter bed is controlled by a series of five sets of two push buttons arranged in logical operating sequence on top of the console. Only four sets are used if surface wash is not needed. One button in a set opens a valve; the other one closes it. Whether a valve is open or closed is indicated by yellow and blue lights above each set of buttons.

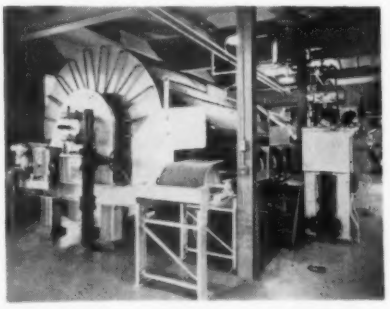
Three indicators mounted on the filter table show (1) loss of head, (2) rate of flow of raw water, and (3) rate of flow of wash water. In addition, a flashing red signal warns when the filter should be backwashed. Controls to regulate the rate of flow of raw water and wash water can be set, as desired, either from the individual filter tables or from a centralized control panel. The filter table can be operated automatically by connecting it to a Fischer & Porter process control system. The table is 40 inches high, 20 inches wide, and 20 inches deep, and presents a compact, pleasing appearance. The standard model fits most filter table requirements but can be adapted for special installations. Details from Fischer & Porter, Hatboro, Pa. or circle No. **8-1** on the coupon.

Industrial-type instruments are used in the new F&P filter operating table

Vacuum Coilfilter for Sludge Dewatering

The Komline-Sanderson Coilfilter is designed for efficient sludge dewatering which is accomplished by two layers of alloy steel coiled springs placed in corduroy fashion around a drum. Power is provided by a variable-speed motor coupled directly to a standard double-enveloping worm gear speed reducer which delivers exceptionally smooth power, a requirement of the filtering action and a major reason for its selection.

Upon completion of the dewatering cycle the two layers of springs leave the drum and are separated from each other by discharge rolls in such a manner that the filter cake is lifted off the lower layer of springs and discharged from the upper layer with the aid of a positioned tine bar. The two spring layers are then washed separately by spray nozzles and reapplied to the drum by grooved aligning rolls. The Coilfilter design allows the springs to flex in opposite directions while being washed to assure that filter media is always clean and output remains constant. Standard Coilfilters are available in a number of models with capacities of from 85 to 500 sq. ft. of area. More from Komline - Sanderson Engineering Corp., Peapack, New Jersey, or circle No. **8-3** on the coupon.



Flexible steel springs replace conventional filter media on this coilfilter

Shawnee Attachments for IHC 300 Utility Tractor

The entire line of Shawnee earth moving equipment is now approved for mounting on the I-H Model 300 tractor. Heretofore, the equipment was adaptable to several other light industrial tractors. The Shawnee line includes the Special Loader, 2,000 lb. capacity with dumping height of 9 ft.; the Scout Ditcher, a lighter weight Backhoe which digs to 7½ ft. and loads to 6½ ft.; the Hydraulically Operated Angle Dozer which allows the driver-operator to angle the blade from the driver's seat; and the 66″ wide Hydraulically Operated Bull Dozer with double acting hydraulic cylinders which provide up and down pressure. Additional information from Shawnee Manufacturing Company, 1947 North Topeka Avenue, Topeka, Kansas, or circle No. **8-2** on the coupon.

Shawnee earth moving equipment that is adaptable to the IHC 300 tractor

Valve Lubricant for Below-Zero Operations

A special sub-zero "torture chamber" was used to test a newly developed valve lubricant for hydrocarbon gas lines operating at temperatures ranging from —50° to +120°F. The experimental lubricant formula was tested in a 24-inch Rockwell-Nordstrom valve. A standard type valve stem packing was used, the compound gear was greased with a special low temperature gear grease, and the valve was mounted in the deep freeze chamber on a fabricated steel framework.

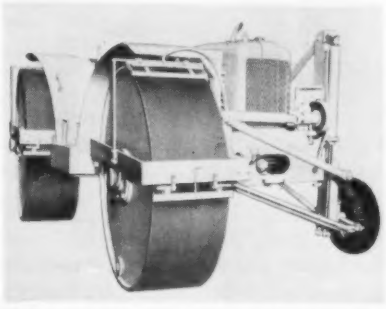
The new lubricant gave a leak-tight seal at temperatures ranging from —50° to +70° at 50 psi and 800 psi line pressure, both balanced and unbalanced on either flange. Even at —50° the operating torque was not excessive. Substitution of a specially prepared low temperature packing materially reduced the torque, as much as one-third at —50°. While the test was underway, the valve was readily re-lubricated at —50° by a Rockwell hand gun which had been brought in from an outside temperature of 70°. More from Rockwell Mfg. Co., Pittsburgh 8, Pa., or circle No. **8-4** on the coupon.

3-Wheel Roller has Roll-O-Matic Drive

The Galion "Chief" three-wheel roller is available with either ballastable-type rolls, in which the weight may be varied by the use of water ballast, or with non-ballastable spoke-type rolls. Four sizes offer a weight range from 10 to 16 tons with standard width of drive rolls 20 inches. The Roll-O-Matic torque converter drive is supplied as standard equipment with no gear shift mechanism. The desired rolling speed is maintained whether working up hill, down hill, or on the level with rolling speeds from 0.8 to 5.5 m.p.h. Engine braking power on downhill grades is smooth and effective. Space is provided under the hood for a 100-gallon sprinkler tank, and the supports for the all-steel canopy cab have been simplified so as not to interfere with the vision of the operator. Other features include hydraulic steering, simplified controls, cab-controlled differential lock on drive wheels, adjustable tapered roller bearings in guide roll and kingpin and choice of gasoline or diesel engine. For information write The Galion Iron Works & Mfg. Co., Galion, Ohio, or circle No. **8-5** on the coupon.

Trench Roller for Road Widening

A dual-compression trench roller for road widening jobs has been announced by Blaw-Knox. It is designed to speed and improve compaction of widened road strips. Equipped with two heavy rolls of 60-inch diameter and 20-inch width, it will exert a compression per inch of roll face ranging from 250 pounds without ballast to 345 pounds with water ballast for each roll. The compaction width can be set anywhere between 20 and 39 inches, even while the roller is in motion, thus permitting the operator to dual-roll where the widened strip is narrow and to roll up to 39 inches per pass where the strip is widened for curves. Rolling depth reaches to 24 inches below existing pavement. The operator is seated between the two rolls, enabling him to see ahead, regardless of direction, and observe the pavement edges and both compression rolls. Reversed fan blades in the engine blow hot air and dust away from the operator.

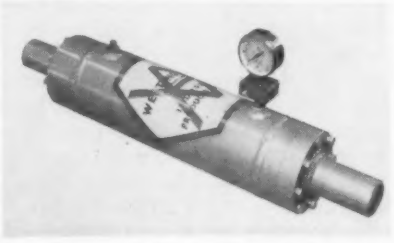


Rolls for width of compaction can be adjusted while the roller is in motion

Each compression roll can be steered independently permitting the operator to work to the inside radius of a curve without reducing his speed. The compression rolls are synchronized with the two mated leveling wheels and swivel-type tie-rods compensate for uneven trench rolling conditions. Two speeds forward and reverse are provided—a low of 1.62 and a high at 5.55 mph. Each roll has a separate brake, built in with differential, to provide both rolls with braking power. Selective additional traction can be obtained by applying the brakes or by locking either side of the braked differential. Water supply and sprinkling system is controlled by a 60-gallon water tank and electric pressure pump. The water flow is controlled by foot. Each roll is equipped with two scrapers and one cocoa mat. Shipping weight is about 15,000 pounds. More from Construction Equipment Division, Blaw-Knox Company, Pittsburgh, Pa., or circle No. **8-6** on the coupon.

Desurger Stops Pulsations and Water Hammer Shock

The Westinghouse Desurger, an in-line unit which dissipates surges from pump pulsations and water hammer impact from rapid valve closures, is available in 1" to 4" sizes with either flanged or tapped case heads. The unit provides a series of throttling orifices surrounded by a flexible annular sleeve which is encased in a shell. During surges, excess pressures are dissipated by forcing liquid through the throttling orifices and distending the sleeve, thus balancing hydraulic pressures with the pneumatic pressures in the air space between the sleeves and the shell. Desurgers are used to eliminate maintenance costs chargeable to pulsations and pressure surges, to increase flow capacity by reducing turbulence and protect instruments, fittings and valves. For more data write Industrial Products Div., Westinghouse Air Brake Co., Wilmerding, Pa., or check No. **8-7**.

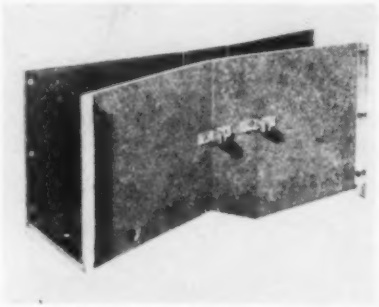


Desurger is available in 1" to 4" sizes

A filter, Model C, designed for small swimming pools and home water supply service is announced by the Sparkler Manufacturing Co., Mundelein, Ill. This filter utilizes an Orlon cloth element with diatomite filtering media. It is equipped with a self-priming pump, motor, and hair trap when used for pool filtering. For home water supply use, the filter operates on water supply pressure alone. It can be cleaned without opening the cover or lifting out the Orlon element. Two sizes are available: 7 sq. ft. and 14 sq. ft.

Accurate Flume Liner Simplifies Construction

This flume can be used as a permanent inside form for a concrete channel or it may be used as the flume section without outside support. The material is basically Transite impregnated with a special asphaltic compound and bonded under pressure. It is impervious to most acid and alkaline liquids and is unaffected by rapid temperature changes. The object of the flume liner is to make a permanent, accurate inside for the channel walls at a Parshall flume section, while the approach and downstream walls are formed in the usual manner. Tolerances are within 1/16″. Angle irons are placed across the top for convenience of assembling and levelling and may be removed after the installation is completed. Flumes 12-in. and larger can be shipped in three sections for convenience in handling. All necessary acid and alkaline resistant cement will be furnished to seal the seams. Full



Prefabricated Parshall flume liners are available with 3″ to 36″ throats

data from Filtration Equipment Corporation, 271 Hollenbeck Street, Rochester 21, New York, or circle coupon No. **8-8.**

SUBMERSIBLE PUMP FOR RAW SEWAGE

A submersible sewage ejector with a 3″ discharge is announced by Weil Pump. This is a heavy duty screenless type, equipped with a non-clog bladeless impeller for pumping raw sewage. Self-contained sealed bearings require lubrication change only once every five years. The motor and all of the working parts are an integral and interchangeable unit. The 3″ dis-

Submersible pump is designed for long service-free duty

charge ejector is available in motor ratings of ½, ¾ and 1 horsepower with capacities to 150 GPM. Full information from Weil Pump Co., 1518 N. Fremont St., Chicago 22, Ill., or circle coupon No. **8-9.**

New Spin-Torque Chuck Announced by Toledo

The new Spin-Torque chuck with special rocking-wedge jaws which tighten as torque is applied is announced by Toledo. A spin of the man-sized hand wheel closes the jaws quickly and smoothly. Diagonal serrations on the jaws eliminate end thrust slippage and permit either clockwise or counter-clockwise rotation. It clamps rod or bolt stock from ¼ inch up and pipe or conduit ⅛ to 2 inches. The special inter-lock feature of the jaws enables the chuck to handle such a wide range of sizes. Thread can be cut up to the face of the chuck. For full details, write Toledo Pipe Threading Machine Co., Toledo 4, Ohio, or circle No. **8-10** on the coupon.

Another New Four-Wheel-Drive "Payloader"

The third and largest four-wheel-drive tractor-shovel of the "Payloader" line has just been announced by Hough. The model HO has a capacity of two cubic yards. The clutch pedal is eliminated. The "powershift" is complete inasmuch as all shifts through all speed ranges in both forward and reverse can be made without coming to a stop or even slowing down. "Pry-out" bucket action is accomplished by using breakout pads on the ground as a fulcrum for leverage. The 40 degrees of bucket breakout at ground level permits retaining larger heaped loads.

The new loader has greater horsepower and more weight. The lifting and dumping height is greater than average and this model is available with either gasoline or diesel power.

New Payloader has simpler, smoother operation and larger bucket capacity

Both head and rear driving lights as well as tail lights are standard and an exterior pick-off outlet for outside hydraulic circuit use with auxiliary equipment has been provided. Full details from The Frank G. Hough Co., 761 Seventh Street, Libertyville, Illinois, or by circling coupon No. **8-11.**

Homelite Brush Cutter Attachment Speeds Clearing

An attachment that converts the Model 17 Chain Saw into an all purpose brush cutter is announced by Homelite. This cutter is designed for use by land clearing contractors, road crews, pipe line companies, railroads and utilities and park and forestry departments. Built for continuous use, it has a flexible shaft with a 10-inch circular blade. A special harness evenly distributes the weight of the unit on both shoulders. A diaphragm type carburetor permits cutting in any position. The 5-foot arm makes it easy to reach low to get under overhanging branches or to reach high. A saw collar prevents binding by weeds, leaves or twigs. For further information, write: Homelite Corporation, Port Chester, New York or circle No. **8-12** on the coupon.

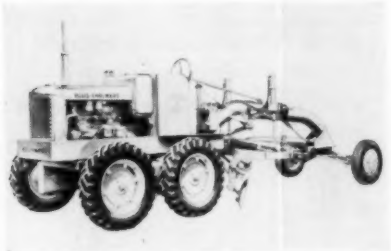
Felling brush with Homelite cutter

An Aerial Lift for Better Tree Trimming and Line Clearance

The Sky-Worker "Tree King' is a new aerial lift which has been developed specifically for tree trimming and line clearance and which provides a high degree of maneuverability, safety and efficiency. It is a complete working "package" which consists of truck, aerial lift, platform body, tool compartment, cab guard, compressor guard, air compressor and pneumatic pruner. The lower boom moves through an overhead arc of 135° meaning a travel of 45° past vertical and has a horizontal rotation of 400°. The vertical and horizontal reach have been increased and the crow's nest is now at the outer end of the boom. For more information write the Tey Manufacturing Corp., Milford, Conn., or circle No. **8-13.**

New Diesel Motor Grader

The Model D diesel motor grader, announced by Allis-Chalmers, has a 6-cylinder, valve-in-head diesel engine rated at 50 brake hp at 1625 rpm; it is also available with gasoline engine. Direct electric starting on diesel fuel is provided by a 12-volt starting system. Engine features include replaceable wet-type cylinder liners; by-pass cooling system; pressure lubrication; aluminum alloy pistons; easily serviced fuel injection system; and four filters to assure clean fuel. Weight is 9,350 lbs. with 2,760 lbs. on the front wheels, and 6,590 lbs. on the rear wheels; blade pressure is 4,900 lbs; speeds range from 2.6 mph in first gear to 25.2 mph in fourth gear. Special equipment includes 135 degree power circle turn; leaning wheel with 25 degree range each way; power-shift mold-board; midship mounted scarifier; 12-foot mold-board; 10-foot mold-board with end bits; 2-foot extensions; cab; snow plow; windrow eliminator; shoulder maintainer; and rear-end loader. More from Allis-Chalmers Tractor Division, Milwaukee 1, Wisconsin, or circle No. **8-14.**



Allis-Chalmers Model D motor grader with 6-cylinder, 50-bhp Diesel engine

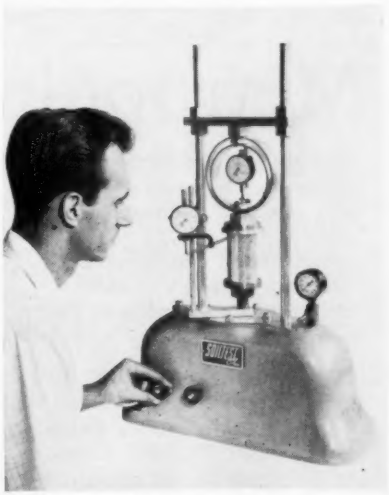
New Power Sweeper Has No Dust Bag

A new design for power sweepers with no dust bag to empty has been introduced by Wayne. The dust control unit deposits fine dust into the main hopper automatically. Specially designed, automtive-type steering and streamlined design enables this sweeper to operate close to walls and equipment without bumping or snagging. Well-placed controls aid in operation and reduce driver fatigue; hydraulic dumping disposes of refuse automatically in one quick operation; large hopper capacity reduces the number of returns to the dumping point; a vacuum hose cleaning connection is available for cleaning out bins, inaccessible areas, etc. The range of sweeping paths is from 36" to 68", with two side brooms, providing a sweeping coverage of over 100,000 square feet per hour. More from Wayne Manufacturing Co., Pomona, Calif. or circle No. **8-15.**

Compact power sweeper introduced by Wayne Mfg. Co. gets into tight corners

PORTABLE COMPRESSION TESTER FOR SOILS

A new portable unconfined compression testing machine for soils makes possible rapid job site or laboratory testing to determine stress and strain relationships of soils for foundation design and construction control. The hydraulically operated tester has a total load capacity of 500 pounds and loads are measured on a sensitive double proving ring assembly. Specimens up to 2½ inches in diameter can be tested. The machine has a one-piece aluminum base with integral air and fluid reservoirs and weighs only 35 pounds. More from Soiltest, Inc., 4711 W. North Avenue, Chicago, Illinois, or circle No. **8-16** on the coupon.



More convenience in soil testing work is possible with this portable device

Called the "Flame-Guard", this is a unique square-type burner with an umbrella style hood. A simple cam-type coupling securely locks the burner to the body yet allows easy removal for filling with no threads to strip or stick. The 20-gauge steel body is made in two halves which are double-seamed to insure against leakage with the bottom weighted for self-righting when tipped. Using kerosene or light fuel oil, the "Flame-Guard" has a burning time of 24 to 48 hours depending on weather conditions. The body is finished in bright red baked enamel with the burner in aluminum baked enamel. For details write Anthes Force Oiler Co., Fort Madison, Iowa or circle the No. **8-17** on the coupon.

New Tractors With "Lowbowl" Scrapers by Caterpillar

Two additions to its rubber tired tractor line: The DW21 (Series C) and the DW20 (Series E), are announced by Caterpillar. Engines are 300 hp at 1800 rpm. The six cylinder, diesel engine is turbocharged for greater horsepower. New design features include a new block, crankshaft, connecting rods, pistons and head. Either direct electric or gasoline starting is available. Speeds for the DW20 (Series E) range from 2.8 mph to 32.1 mph; on the DW21 (Series C) from 2.3 mph to 20.5 mph. Caterpillar has designed two new matching scraper "lowbowl" units—the No. 456 Scraper for the DW20 (Series E) and the No. 470 Scraper for the DW21 (Series C), with capacity to 18 yards struck and 25 yards heaped. A new

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Los Alamos requires a chemist with good foundation in bacteriology to supervise laboratory section of research and development group working on methods of treatment of radioactive wastes as well as operation of small waste treatment plants. Must have B. S. in Chemistry, advanced degree preferred, and a minimum of 10 years experience in field of waste treatment. Salary is $600 to $700 range dependent on education and experience. Pleasant working conditions in delightful high, dry climate. Liberal benefits include generous annual and sick leave time and excellent retirement plan. *Write Attn:* John A. Stevenson.

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A man with six years experience including two years at the foreman level in the installation and repair of water mains and appurtenances and high school graduation (substitution of Exp. for Education on a year for year basis) is just what we need. If you meet these requirements please contact:

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Permanent position for technically qualified civil or sanitary engineering graduate to assist divisional sales manager in market and application development for control instrumentation for water and sewage treatment installations. Experience with consulting engineers or sanitary utilities desirable. Reply by letter only to

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The Foxboro Company
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SALARY: $4930 to $6192 a year

Excellent opportunity with Philadelphia's Water Department. Vocational or high school graduation plus 6 years experience in maintenance and operation of large electrical pumping stations. Three years of experience should have been in supervision. Substitutions of experience or training for above will be considered. Civil service security, health and welfare plans, paid vacations, and sick leave. For further information, contact before Aug. 15, 1955.

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high lift apron gives faster and more positive material ejection under all conditions. Higher ground clearance permits work ability under extremely soft conditions and over rough terrain. Full information from Caterpillar Tractor Co., Peoria, Ill., or circle No. **8-18** on the coupon.

The Quad City Slip-Form Paver

The Quad City paver is a self-propelled slip-form concrete paver, adjustable from 20 ft. to 25-ft. width of pavement and to 10″ depth of slab. It is a gas electric powered unit, driven from a 10,000-watt engine generator. The capacity of this machine for Portland cement concrete pavement is said to exceed the capacity of mixing equipment that can be efficiently used on the job. The tamping action of the extruding mechanism eliminates the necessity of any additional spreading operation. The two sections of trailing forms are not for the purpose of holding the edges of the slab while it sets but to allow workmen to finish the edges and check the vertical tolerances with a straight edge. The standing of the vertical edge of the concrete is due to compaction by the tamping mechanism and vibratory screeds. More data from Quad City Engrg. Co., Rock Island. Ill., or circle No. **8-19** on the coupon.

New 7 Yd. Euclid Hydraulic Scraper

The latest addition to Euclid's motor scrapers is a 7-yd. unit, the S-7, giving Euclid scrapers with 7, 12, 15.5 and 18. cu. yds. struck capacities. The S-7 is Euclid's first overhung engine scraper. It is powered by a 143-hp. diesel with a 5-speed transmission. Tires are normally 18.00 x 24, 16 ply, but for jobs requiring maximum traction and flotation 21.00 x 25 tires are available. All of the scraper operations, bowl, apron and ejector, are controlled by hydraulic lever action. A four section cutting edge, with each section identical, adjustable and reversible, provides a most efficient blade arrangement for any type of material and gives longer blade life. For example, a straight edge is usually best for land leveling and fine grading, while a drop center arrangement with maximum overhang of the two center sections gives the best loading action in hard materials. Catalog literature and complete specifications from any Euclid dealer, from Euclid Division, Cleveland 17, Ohio, or circle No. **8-20** on the coupon.

Lightweight, Portable Earth Drill

A newly developed earth drill, mounted on either a two or four-wheel drive vehicle, can be used for soil sampling jobs such as investigations of soils and rock for building foundations; prospecting; drilling blast holes; post hole digging; and drilling concrete cores from pavements or floor slabs. The drill can take power from a power take-off of a vehicle or from another power source and in drilling position is moved out from the vehicle by a hydraulic system. Two jacks at the rear of the vehicle stabilize the vehicle and drill, keeping both level during the drilling operation. In addition to boring into the ground with continuous flights of augers, the drill can drill rock or cores in pavements to a maximum diameter of six inches. Additional information from Continental Equipment Sales, Inc., 1810 N. Twelfth St., Toledo, Ohio, or by checking the coupon No. 8-21.

New Side Boom for Oliver OC-3 Crawler

An exceptionally handy and highly versatile side boom is available for the Oliver OC-3 Crawler. This "Little Boomer" is designed for pipeline contractors, depots and yards, municipal and sewer contractors, oil companies, etc. It lifts loads of up to 1,600 pounds. It will lay and lower in up to 6″ line and will carry single 48-foot lengths up to 12 inches. For greater stability with heavy loads, it can be equipped with automatic hydraulically operated counterbalance.

Load and boom lines operate off two hydraulically driven winches with two simple controls. The whole unit can transported on a medium-sized hauling truck and—with pavement plates attached—tracks will not damage concrete, asphalt or turf. The steering mechanism keeps power on both tracks at all times. Also available for this OC-3 tractor is an 8,000-pound capacity towing winch and a bulldozer-backfilled blade. Illustrated literature from The Oliver Corporation, Dept. 3B, 400 West Madison Street, Chicago 6, Illinois, or circle No. 8-22 on the coupon.

Galion Adds 3-Axle Tandem Roller

A 3-axle tandem roller has been announced by Galion which has a variable weight range from 14 tons (metal weight) to 20 tons fully ballasted with water. In addition to the main compression or drive roll, it has twin guide rolls with synchronized hydraulic steering. Finish rolling is said to be up to 50 percent smoother, and up to 60 percent greater tonnage of material can be compacted per day. An important feature of this roller is the Roll-O-Matic torque converter drive which is standard equipment. Reports indicate that this drive saves up to 25 percent in fuel; engine life is increased 35 percent and forward-reverse clutches 40 to 50 percent. Rolling speeds are from 0.8 to 5.5 mph. Engine braking power on downhill grades is smooth and effective. More from Galion Iron Works & Mfg. Company, Galion, Ohio, or circle No. 8-23 on the coupon.

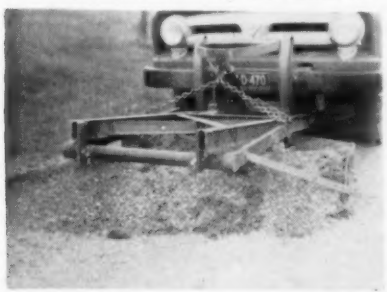
• • •

Mobile Lubrication Service for City Equipment

Costs have been reduced in Long Beach, Calif., by establishing a mobile vehicle lubrication and maintenance unit. It services up to 280 equipment units and is operated by one man, with a helper at times. The need for bringing heavy equipment units to a central repair point has been reduced and lost time on the job is also lessened.

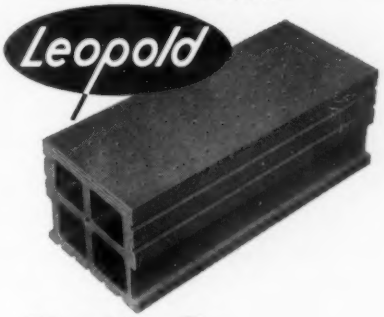
Push Type Shoulder Shaper Introduced by Gledhill

A new push type shoulder maintainer is announced by Gledhill. According to Ed Gledhill, Board Chairman, this device will be known as the Gledhill "Push Shaper." It is intended to provide a shoulder maintainer that can be mounted on the truck's underframe or on the front push frame for snow plows. It will utilize existing hydraulic equipment to raise or lower the blade. The weight is 600 pounds and it covers a 6-foot width. It is easy to maneuver and effective on road maintenance. More from Gledhill Road Machinery Company, Galion, O., or circle No. 8-24 on the coupon.



Push shaper maintains road shoulders

PROVED PERFORMANCE
in over 300 plants with a daily capacity of 1¾ billion gallons...



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Leopold Duplex Filter Bottoms are getting more popular every day. And for good reasons, too. They last longer, perform better, and are unequalled in economy. Want more details on this "performance-proved" filter bottom? Write us today. No obligation.

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PURE WATER
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"Hippocrates' sleeve" (a cloth straining bag) was a popular water treatment method in the 4th Century B. C.

For excellence in MODERN water treatment equipment —gravity and pressure filters—recirculation apparatus...

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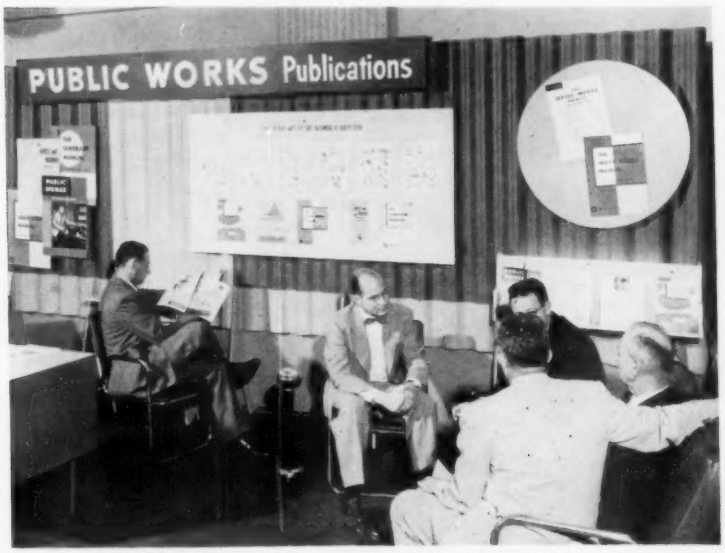
—Worth Seeing

Here at the Permutit booths at the Chicago AWWA meeting we had our first look at their new automatic gravity filter. A model of the unit, seen at the left, was put through its paces at frequent intervals to demonstrate automatic backwashing without the use of valves or controls.

Those of you who were at the Chicago AWWA convention last June will be glad to see the smiling face of Audrey Becker again—the girl who made Coca-Cola famous there. Under her charm some admirers downed twelve glasses of it a day. Our own best day's score was three.



Water works men attending the Chicago convention flocked to the PUBLIC WORKS booths to congratulate Colonel W. A. Hardenbergh (right) on the history-making full-color algae pictures and article in June issue.

Gale Storm, star of stage, screen and television, smilingly acknowledges Los Angeles Plumbing Inspector George Hartman's approval of an Orangeburg pipe installation at her Encino, Calif., home. The project represents a Hollywood "first" for the Orangeburg Manufacturing Co., Inc., of Orangeburg, New York and Newark, California.

Civil Defense in action in Chicago! A convoy of six new International trucks swings into Chicago's LaSalle Street at City Hall for delivery to city and Civil Defense officials after demonstration.

It's Terrific . . .

the **NEW**

TOLEDO

SPIN TORQUE CHUCK

The Perfected Chuck-Locks Tight with a *Spin of the handwheel!*

- No more rocking, socking or hammering with the new "TOLEDO" SPIN TORQUE CHUCK. Now you can chuck ⅛" to 2" pipe, or rod as small as ¼", with a spin of the handwheel. Jaws are flush with chuck—exclusive rocking wedge action of jaws prevents slippage — husky "big hand" grip on wheel is easier to tighten — no end thrust slippage. See them at your pipe tool suppliers, now. Next time try "TOLEDO".

THE TOLEDO PIPE THREADING MACHINE COMPANY
1445 SUMMIT ST., TOLEDO 4, OHIO

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS
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PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

WORTH TELLING

by Arthur K. Akers

★ DON T. HELTZEL, formerly of Heltzel Steel Form and Iron Co., Warren, Ohio, is now president of the new General Road Machines Inc., manufacturers, Niles, Ohio.

★ MILO E. SMITH, for 28 years advertising manager of Chicago Bridge and Iron Co., went on his company's retired list July 1. He was active in the Chicago Advertising Association for 30 years, and was a vice president of N.I.A.A. in its earlier years.

★ R. A. (Dick) McQUADE, long with Simplex Valve & Meter Co., now heads the Municipal Division, Penn Instrument Co., Division of Burgess-Manning Co. at Philadelphia 4.

★ WE PRESENT here J. A. (Al) Frank, vice president and general manager of the National Water Main Cleaning Co., who is the new president of the Water and Sewage Works Manufacturers Association.

Mr. Frank **Mr. Gard**

★ GEORGE W. GARD will head Fischer & Porter Company's new Municipal Division at 16511 Kinsman Road, Shaker Heights, Cleveland. Glenn C. Wanich becomes their assistant sales manager, Chlorinator Division, Hatboro, Pa.

★ BUFFALO STEEL CORPORATION, Tonawanda, N. Y., names G. E. Shuttleworth sales manager of its Post Division.

★ MID-WESTERN INDUSTRIES Inc., Wichita, Kans., has entered into a sales agreement with Massey-Harris-Ferguson Inc. by which Mid-Western's Davis front-end loaders and Pit-Bull material-handling and excavating machines will be sold nationally through Massey-Harris-Ferguson dealers.

★ HARVEY HOWE, vice president of Lock Joint Pipe Co., honors us with a beautiful book, "Life Lines of Civilization." We do not know a better name for the big water pipe lines that make urban life possible.

★ ADD pleasant June duties; attending a sales luncheon in New York hosted by A. Reed Wilson, Kansas City, of W-B Manhole Adapter fame. A group of Big Time New York City and utilities engineers graced the occasion. We 'tended bar and acquired valuable information.

★ KERRIGAN IRON WORKS, Nashville, retains G. G. Greulich as consultant for a new four-way grid open steel flooring which Kerrigan will produce. Harvey F. Neel comes to Kerrigan after 20 years with the Pennsylvania State Highway Department to be chief engineer of the new Division.

★ OUR COUSIN Ken, who puts out those striking Warner & Swasey ads, says of Walter Reuther's GAW, "Whatever the fancy name, you still have to earn it if you're going to get it for long."

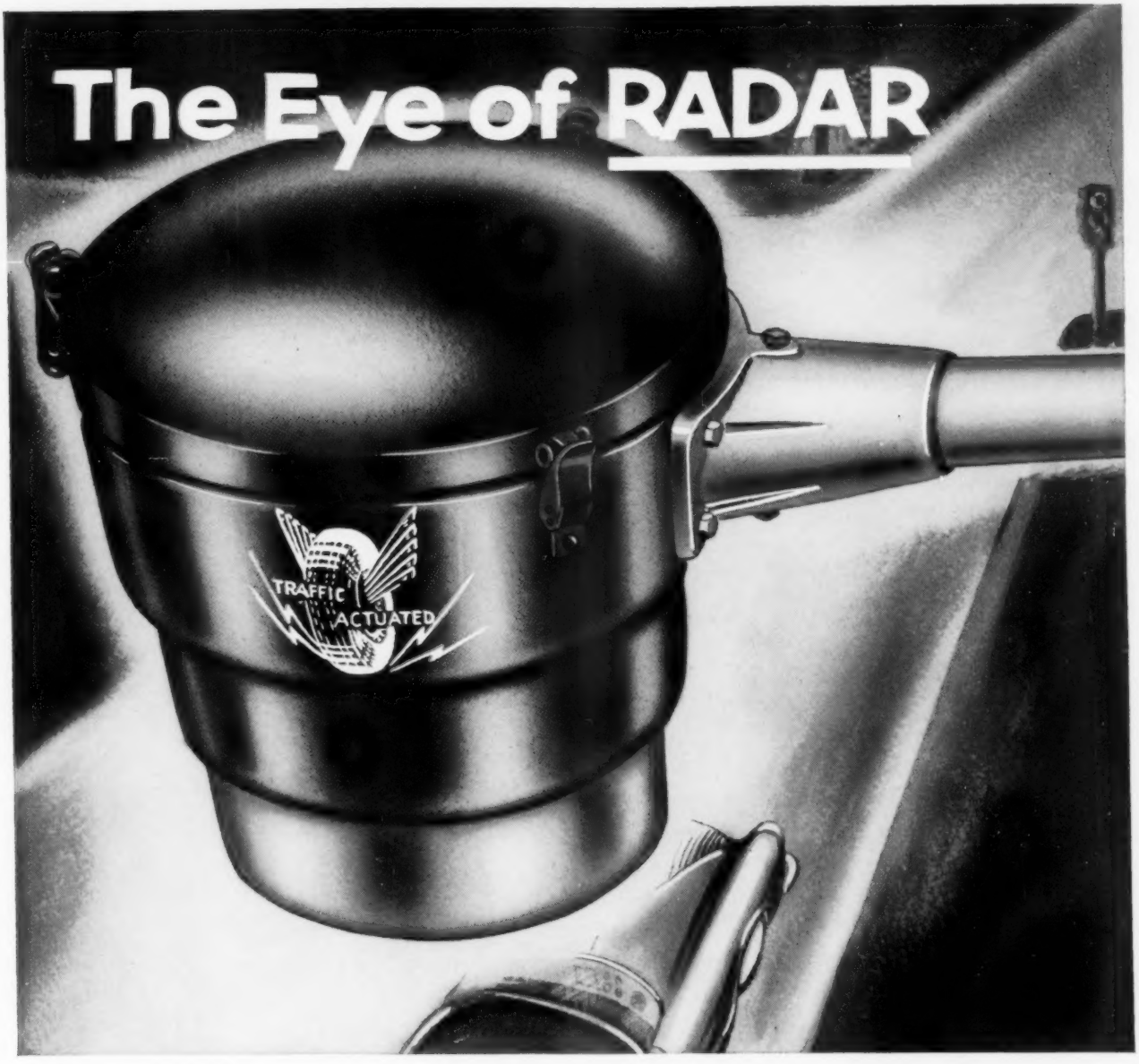
★ HARRY A. RONAN is New England regional manager, Motorola 2-way radio, at Winchester, Mass.

★ AERO SERVICE Corporation, Philadelphia, names Eion E. Dando regional manager, new West Coast Offices, 68 Post Street, San Francisco.

★ WILLIAM R. TROYER is newly appointed Galion Iron Works supervisor of sales and service training; graders, rollers.

★ "WHAT'S the matter with you?" demanded the man's wife. "Monday you liked beans; Tuesday you liked beans; Wednesday you liked beans; now all of a sudden you don't like beans."

—Dickey Data



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in the modern manner . . .

The Electro-Matic® RADAR VEHICLE DETECTOR presents an entirely new concept in detection for traffic-actuated control. Situated *above* the street, the magic eye of radar operates continuously, unaffected by weather or climate. Completely electronic, it is dependable, accurate, and versatile. With no need for pavement excavation, the Model RD-1 Detector is readily moved or adjusted to roadway changes. It's easily installed on bridges, or wherever installation of regular detectors previously had been difficult.

There *are* many locations where nothing else can do the job as well, or as economically as the RD-1. Write for the copy of the new Radar Detector Bulletin D-154 for details.

TRAFFIC ACTUATED

AUTOMATIC SIGNAL DIVISION

EASTERN INDUSTRIES, INCORPORATED

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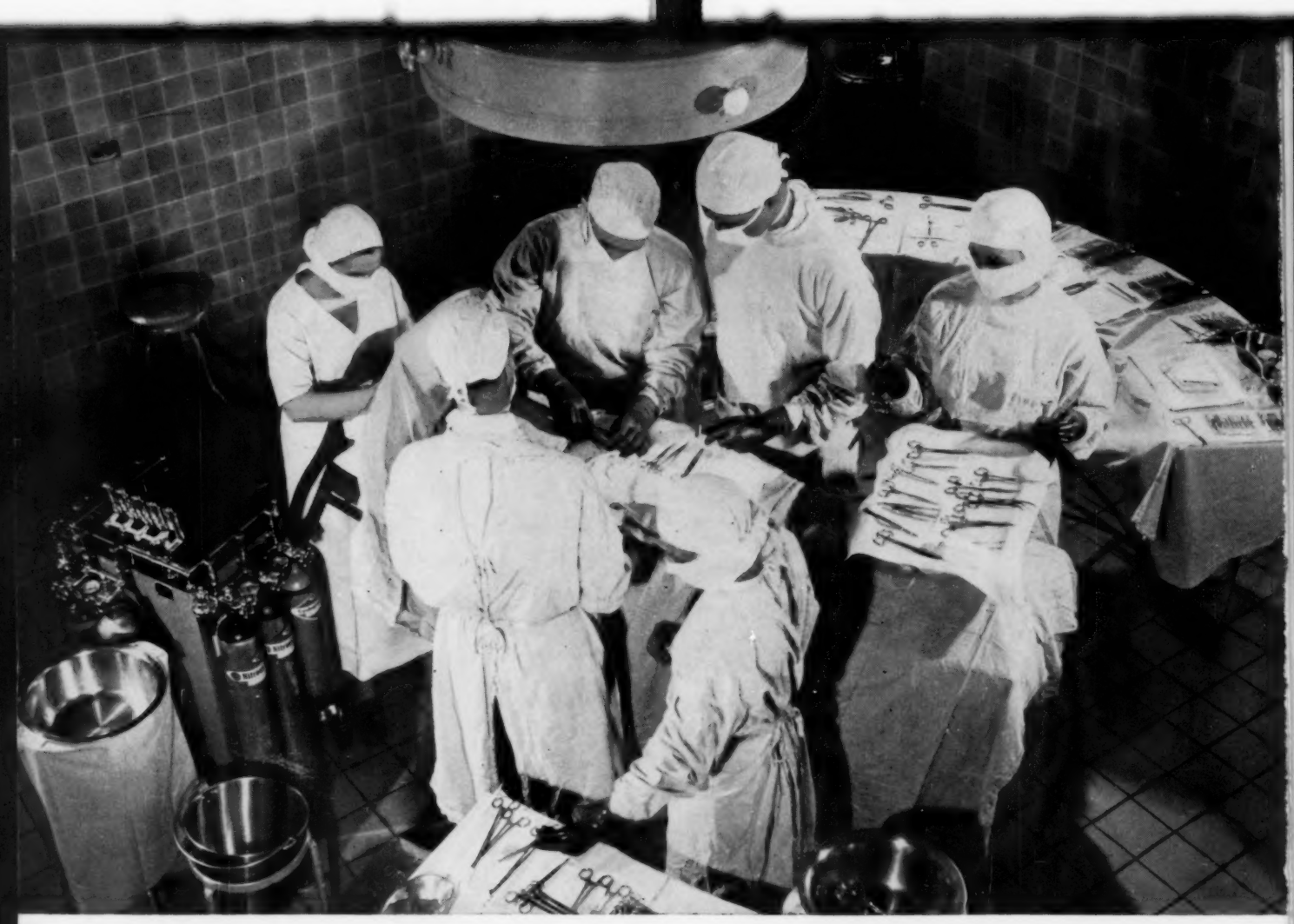

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...*Strength in Depth*

Just as the surgeon depends on the group around him, as well as his own skill . . . so your W&T chlorination equipment is strengthened by the organization behind it.

The W&T field organization, all of whom are factory trained and qualified, is always available on short notice to supervise the installation of W&T equipment, to render service and assistance regarding your chlorination or chlorinator problems, and to provide equipment and service in times of disaster.

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When you depend on W&T equipment, you have the assurance that 40 years of experience by this team is being used to bring you the best in service, design and dependable performance.

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